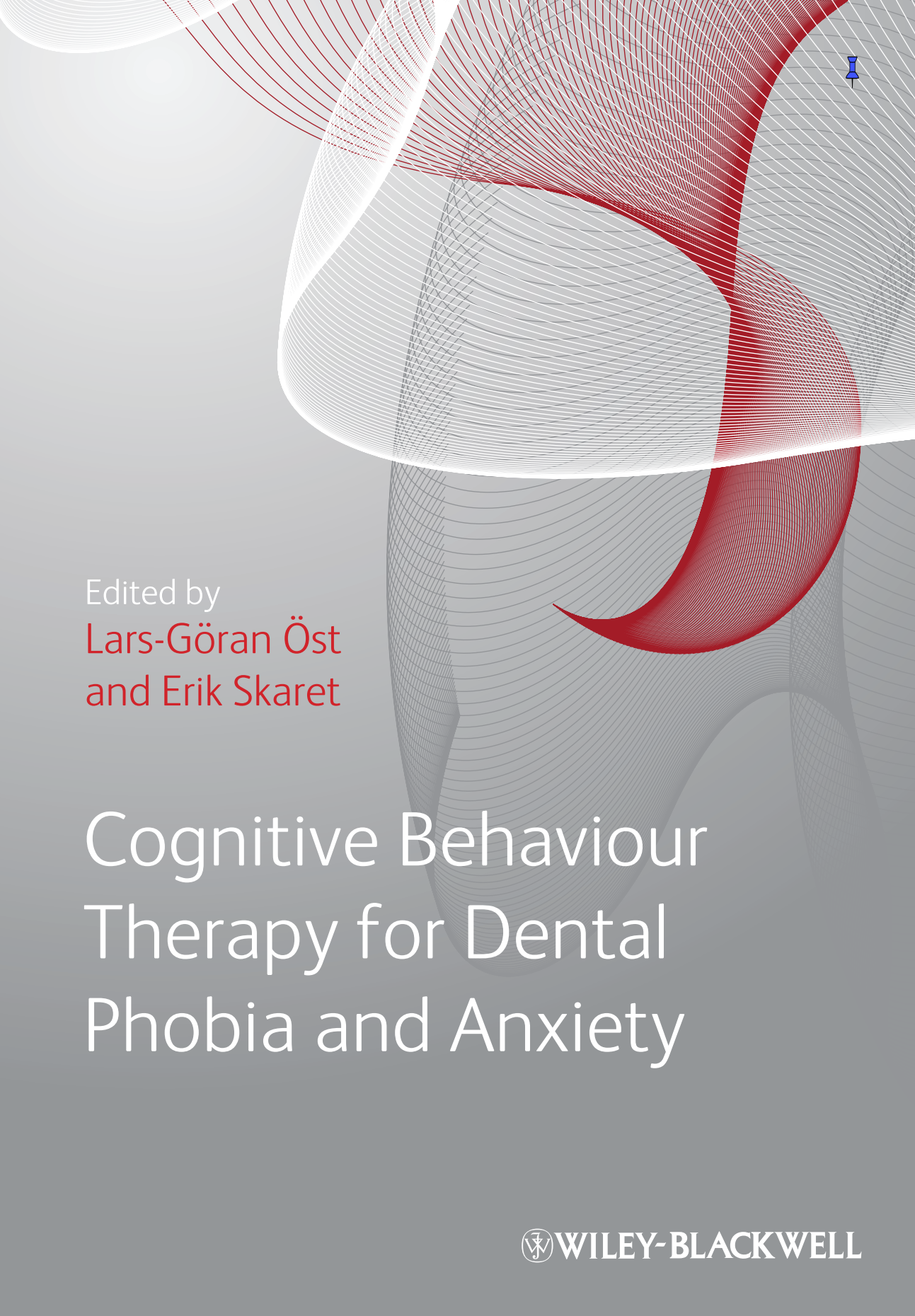




Edited by
Lars-Göran Öst
and Erik Skaret

Cognitive Behaviour Therapy for Dental Phobia and Anxiety

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Cognitive Behaviour Therapy for Dental Phobia and Anxiety

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Erik Skaret



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Contents

List of Contributors	vii
Preface	ix
Acknowledgements	xi
Part I Background, Assessment and Aetiology	1
1 Symptoms, Clinical Characteristics and Consequences <i>Magnus Hakeberg and Jesper Lundgren</i>	3
2 Background Description and Epidemiology <i>Magne Raadal and Erik Skaret</i>	21
3 Assessment of Dental Phobia and Anxiety <i>Kristin Haukebo and Margrethe Vika</i>	33
4 Aetiology of Dental Phobia <i>Tiril Willumsen, Kristin Haukebo and Magne Raadal</i>	45
5 Intra-Oral Injection Phobia <i>Margrethe Vika and Maren Lillehaug Agdal</i>	63
6 Dental Anxiety in Children and Adolescents <i>Gunilla Klingberg</i>	79
Part II Treatments	89
7 Cognitive Behaviour Therapy: Principles, Procedures and Evidence Base <i>Lars-Göran Öst and David M. Clark</i>	91
8 Multimodal Cognitive Behavioural Treatment <i>Jesper Lundgren and Ulla Wide Boman</i>	109
9 One-Session Treatment of Dental Phobia <i>Lars-Göran Öst</i>	119

10	The Combined Treatment <i>Erik Skaret</i>	135
11	Dental Treatment under Sedation <i>Magne Raadal</i>	153
12	Effects of Cognitive Behavioural Treatments: A Systematic Review and Meta-Analysis <i>Lars-Göran Öst and Gerd Kvale</i>	163
	Part III Cultural Aspects, Prevention and Future Research	183
13	Different Treatment Approaches in Different Cultures and Health-Care Systems <i>Peter Milgrom, Lisa J. Heaton and J. Timothy Newton</i>	185
14	Prevention of Dental Phobia <i>Erik Skaret and Magne Raadal</i>	201
15	Future Research and Applications <i>Lars-Göran Öst and Erik Skaret</i>	221
	Index	231

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Peter Milgrom, DDS, is Professor of Oral Health Sciences and Pediatric Dentistry at the University of Washington, USA. He was Director of the Dental Fears Research Clinic at the university for nearly 25 years. His latest book (with Philip Weinstein and Lisa Heaton), *Treating Fearful Dental Patients*, was published in 2009.

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Lars-Göran Öst, PhD, is Professor of Clinical Psychology at Stockholm University, Sweden. During the last 40 years he has carried out RCTs on most anxiety disorders in adults and children, and has developed three evidence-based CBT treatments: one-session treatment for specific phobia, applied relaxation for generalized anxiety and applied tension for blood phobia.

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Preface

This book is a result of a multi-disciplinary research cooperation between dentists and psychologists. It is meant to help students and professionals in dentistry to understand the complexity of the anxiety phenomenon, and in psychology to understand the specific situation for the dental phobia patient, and bridge the gap between dentistry and psychology. The book was first planned to be written for Scandinavia, and most of the authors are therefore from these countries. This plan was then changed and a few more authors outside Scandinavia were included. However, we know many researchers in behavioural science in dentistry and in psychology around the world that would have been very qualified for being included on the author list of the present book.

Being a practising dentist is in many ways a challenging and stressful job. Before they leave the surgery after a long day with patients they often have a brief glance at the list of scheduled appointments for tomorrow. Some names on the schedule can result in unpleasant feelings: 'I hope the patient after lunch cancels or does not show up'. The first thought in the morning is: 'Today this patient is coming again. I always feel stressed and uncomfortable because I don't know how to treat him. I know the patient is doing his best, but I am afraid of losing my patience and saying things like: "You have to leave my office. It is impossible for me to do my job". These patients make me feel incompetent and unsuccessful. The treatment doesn't have the quality it should have, and I am afraid this will have a negative influence on my reputation. I want to be a good dentist'. Being able to help people with dental anxiety or dental phobia to manage ordinary dental treatment provides the job as a dentist a new dimension.

Clinical psychologists know how to treat psychological disorders. They also know that there are different treatment approaches, and they probably also know that cognitive behaviour therapy (CBT) is the treatment of choice for specific phobias. However, they don't know much about the dental phobia patient. Their knowledge of dentistry is most often only based on their own experiences in the dental chair. We hope this book will be helpful when new patients explain their avoidance of dental care and its consequences for daily life.

Over the years it has gradually been recognized that greater effort should be directed towards behaviour management and psychological interventions aimed at reducing patients' anxiety in the long run without pharmacological support. CBT is a problem-focused psychological intervention which seeks to teach patients skills for self-management of their anxiety. Treatment of phobia in one or more sessions is not possible to learn by reading a book

about the subject, but practising the basic principles of CBT described in this book can start tomorrow. Building a trusting relationship, exploring negative thoughts and performing gradual exposure to the most fear-provoking procedures in a controlled way will help patients attend regular dental care.

Organization of the Book

The first part of this book starts with descriptions of symptoms, clinical characteristics and consequences (Chapter 1), background data and epidemiology (Chapter 2), assessment (Chapter 3), and Aetiology of dental phobia (Chapter 4). These are followed by a chapter on a 'close relative' of dental phobia, intra-oral injection phobia (Chapter 5), and dental anxiety in children and adolescents (Chapter 6). The second part of the book focuses on treatment and begins with a general description of the principles, procedures and evidence base of cognitive behaviour therapy (Chapter 7). This is followed by detailed descriptions of some treatments; the multimodal cognitive behavioural treatment developed in Gothenburg (Chapter 8), the one-session treatment developed by the first editor (Chapter 9), the combined treatment developed by the second editor at the Center for Odontophobia in Bergen, Norway (Chapter 10). This part ends with a description of dental treatment under sedation (Chapter 11), which probably is the most common way to treat dental phobia today, and a review and meta-analysis of randomized controlled trials of CBT for dental phobia (Chapter 12). The final part of the book discusses different treatment approaches in different cultures and health-care systems (Chapter 13), prevention of dental phobia (Chapter 14), and future research and applications (Chapter 15).

Acknowledgements

This volume is based on the considerable clinical research of many of our professional colleagues around the world, which shows that research is a gigantic international collaboration. We also appreciate the input from all the patients, young and old, who have participated in our research over the last four decades. It is through these contacts that we have learned how to treat phobias in general and dental phobia in particular. Without them this book would not exist. We would also like to thank all our authors for their time, expertise and contributions to this volume. Without them, the volume would be very thin.

Finally, we would like to extend special thanks to our families, friends and loved ones. I (Erik Skaret) would like to offer my sincerest gratitude and appreciation to Magne Raadal, Gerd Kvale, Einar Berg, Ulf Berggren (d. 2009), Peter Milgrom, Philip Weinstein and Tracy Getz for inspiring and supporting me on my way into the academic area of behavioural sciences in dentistry. I am greatly indebted to Lars-Göran Öst who taught me one-session treatment of specific phobia. I feel very privileged for having had the opportunity to work with him both clinically, as a researcher, and co-editor of this book. I want to thank my patients who believed in me enough to be willing to explore their anxiety and test their strong catastrophic beliefs with me.

Some days ago I crossed the beautiful Norwegian mountains by car on my way to a wedding. I was sitting next to the driver with my laptop on my knees, writing a draft of this preface. I am warmly grateful to the driver of the car, my lovely wife, Eli, for her endless understanding nature and for reminding me very gently about all the things that are much more important in life than writing this book. I also want to thank Kristine, Bebbe and my grandchild Agnete for never complaining when I did not have time to do things together with you.

I am very eager to share my enthusiasm about the CBT approach. Some months ago I met a colleague, a dentist who had passed our course on psychological and pharmacological treatment of dental phobia. This is what my colleague said: 'The course has changed my day completely. I have implemented the principles of CBT in my daily practice, and I am no longer worried about any patient on my schedule for tomorrow!' My hope is that this book may give some of these feelings to our readers.

I (Lars-Göran Öst) wish to thank Magne Raadal and Gerd Kvale for their early and never-ending interest in dental phobia and for convincing me to, once more, work with this group of patients, and Erik Skaret for developing the idea of this book with me. The collaboration on

this project has been stimulating and reinforcing. I also wish to thank my wife Margareta, our daughters Ulrika, Cecilia and Magdalena, and our grandchildren Rebecca, Anton, Engla, Alvin and Alice. Without their continuous support over the years much less would have been achieved in terms of clinical and research development.

Erik Skaret and Lars-Göran Öst
Oslo and Stockholm, December 2012

Part I

Background, Assessment
and Aetiology

Symptoms, Clinical Characteristics and Consequences

Magnus Hakeberg and Jesper Lundgren

Introduction

This chapter will discuss the underlying factors concomitant with dental fear and anxiety and dental phobia and how such different symptoms interact in the maintenance of the irrational fear and possible future consequences. In the text fear and anxiety will be used interchangeably. However, phobia has another grading, which is related to the definition according to DSM-IV, and will not be interchanged with other terms.

The phenomena of dental anxiety, where individuals typically show different signs and symptoms related to dental care, have been revealed to be similar, irrespective of country, culture and other living conditions (Armfield, Spencer and Stewart 2006; Hakeberg, Berggren and Carlsson 1992; Milgrom et al. 1988; Moore et al. 1993; Neverlien 1990; Stouthard and Hoogstraten 1990).

The prevalence of high dental anxiety ranges between 3 per cent and 10 per cent depending on measurement methods and sample selections. Moreover, since the first scientific reports on the epidemiology of dental anxiety it seems that it is as common today as it was 40 to 50 years ago (Armfield et al. 2006; Freidson and Feldman 1958; Hakeberg et al. 1992; Milgrom et al. 1988; Moore et al. 1993; Neverlien 1990; Stouthard and Hoogstraten 1990). We may ask why the prevalence has not changed during this period of time despite the continuing progress of dental care. Greater awareness of the problem, technological advances and better undergraduate curriculum and postgraduate education should possibly have decreased the prevalence of dental anxiety. One answer may be that the majority of the group of individuals with moderate dental anxiety has become less anxious. Several scientific reports indicate such a development when comparing cohorts over time in repeated cross-sectional studies (Hägglin 2000). However, there are still individuals who are highly fearful of dental care and procedures. These persons report that being highly fearful or even phobic

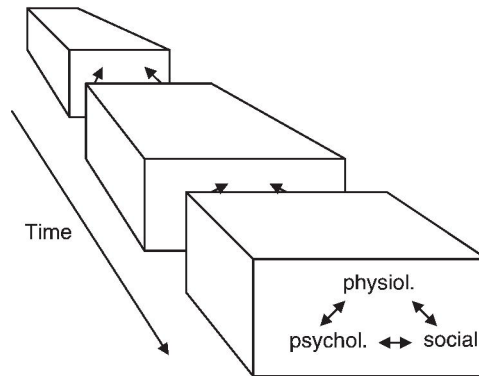


Figure 1.1 A systems-oriented multi-causality model where different factors of physiological, psychological and social character interact in the development and maintenance of diseases. Modified from Carlsson and Jern 1982

of dental care affects their life situations in many different ways. This chapter introduces the major symptoms related to high dental anxiety or dental phobia.

Since the 1970s a large amount of research literature has shown that individuals with reported dental anxiety and phobia are also affected by different negative manifestations and consequences related to physiological, psychological and social aspects of their health and life situations. In such a perspective we may relate to Carlsson and Jern's (1982) theoretical model, which describes a specific causal theory and a paradigm shift concerning the relationship between biological, psychological and social factors (Figure 1.1). They suggested a systems-oriented multi-causality model where different factors interact in the development of a disease. It is assumed that social, psychological and physiological components are in constant interaction with each other, leading over time to psychological, social and somatic changes. Such changes affect the successive interaction.

The vicious circle of dental anxiety

Applying this perspective to dentistry, Berggren presented a model that describes several components of the effects from severe dental anxiety resulting in the establishment of a vicious circle (Berggren 1984; Berggren and Meynert 1984). Such a vicious circle, or rather vicious cycle, since time is an important component in the development of disease and illness, is shown in Figure 1.2. A person's initial fear and anxiety may lead to an avoidance of or irregular dental care. This can mean irregular dental visiting habits with only emergency dental treatments, or even total avoidance. If necessary treatment is not carried through then oral health may be affected negatively, for example, with the development of carious lesions in the teeth as well as a progress of periodontitis. Thus, deterioration of the oral status starts to progress, causing the individual to be aware of the effects on their oral health. Not being able to carry through with regular dental care and treatment may further initiate feelings of inferiority, shame and embarrassment about the situation and for a dentally anxious individual such feelings may over time give rise to obvious social problems in daily life situations such as during contact with people at work, with friends or relatives and/or at home within the family. With time, this pattern of effects may lead to higher and more widespread anxiety of dentistry and eventually less regular dental care or even avoidance of dental treatment.

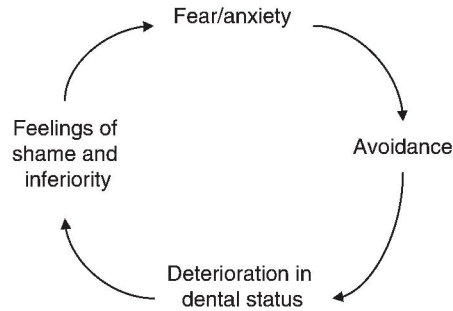


Figure 1.2 The vicious cycle model of dental anxiety and fear according to Berggren 1984

Measurements of dental anxiety

Dental anxiety may be seen as a phenomenon measured on a continuum, from no anxiety to extreme anxiety. Several different measurement scales have been used in scientific studies. Global, single-item questions are frequent, via a visual analogue scale (VAS) and verbal rating scales using a Likert format (Hägglin et al. 1999; Milgrom et al. 1988; Pohjola et al. 2009). However, multiple item scales such as the Dental Anxiety Scale (DAS) (Corah 1969), the Modified Dental Anxiety Scale (MDAS) (Humphris, Morrison and Lindsay 1995), the Dental Fear Survey (DFS) (Kleinknecht and Bernstein 1978) and the Dental Anxiety Inventory (DAI) (Stouthard, Hoogstraten and Mellenbergh 1995) are applied more often. Armfield (2010a) has published a new measure of dental fear (Index of Dental Anxiety and Fear, IDAF-4C+) based on DSM-IV specific phobia categories and of emotional, behavioural, physiological and cognitive components of the anxiety and fear response. Although the IDAF-4C+ is promising, only a few studies have used the measure, implicating the need for obvious psychometric testing concerning reliability and validity in different samples of specific and general characters. Multiple item scales are often used with a cut-off value to identify highly dentally anxious subjects. Among other things, one problem with the analyses which use a transformation of a scale to dichotomize a variable after a specific value is that information about subjects may be lost. In addition, the scaling of the tests sometimes infers ceiling and/or floor effects which may hamper the interpretation of how anxious individuals really are. Such methodological aspects are important when analysing characteristics and consequences of dental anxiety among patients or individuals.

Another issue that should be taken into account is the differences between the subjects included in the scientific reports on dental anxiety. Generally, two different sample selections have been used in the research designs. Firstly, clinical samples of highly dentally anxious individuals or dental phobic subjects have been included in experiments using different treatments for dental anxiety. Typically, different aspects of negative effects of dental anxiety have been reported in these studies, but subjects have more or less also avoided dental care completely or nearly completely for a longer period of time. Thus, such clinical samples may describe a narrower effect of dental anxiety on negative consequences, such as health and psychosocial effects. Subjects attending special clinics for the treatment of high dental anxiety or dental phobia with avoidance behaviours of ordinary dental care usually show important and negative impacts on health and psychosocial consequences. However, when examining subjects randomly selected from the general population, who report high dental anxiety or dental phobia,

the effects on health and psychosocial consequences show a wider spectrum with regard to these outcomes. This difference, is important to bear in mind when evaluating the symptoms, characteristics and consequences of dental anxiety due to the selected study sample. Having said this, this chapter will illuminate both types of study sample selections and associated impact on health and psychosocial factors.

Symptoms, Characteristics and Consequences of Dental Anxiety and Dental Phobia

The different symptoms, characteristics and consequences of dental anxiety, dental phobia and injection phobia (IP) are described below with regard to oral health, dental attendance behaviours, psychological and physiological factors. The effects of dental anxiety described in this chapter use the theoretical model of Berggren's vicious circle; and results from both clinical and observational studies will be shown to exemplify important factors associated with the phenomena of dental anxiety.

Avoidance of dental care

Avoidance of dental care and treatment is usually a strong predictor of high dental anxiety. Individuals with dental phobia are, according to the defined criteria of phobia in DSM-IV, avoiders of dental care. However, in both clinical samples and observational studies there is a variability in the degree of avoidance behaviour. The measurement of dental attendance is mostly by self-reported data by the subjects, and concerns the last visit to a dental clinic or frequency of regular visits to a dental clinic (Armfield et al. 2006; De Jongh, Schutjes and Aartman 2011; Hägglin 2000; Pohjola et al. 2009). These measures vary in different studies, albeit there is reasonable congruence between reports. In general, there is an abundance of data supporting the association between high dental anxiety or dental phobia and irregular dental visiting habits regardless of culture and country. In an attempt to describe different categories of dental visiting habits, Milgrom discussed individuals' level of dental anxiety and choice of regular dental care via an approach–avoidance conflict to dental care (Milgrom 1985). Four types of patient categories were allocated. Firstly, subjects that feel low to moderate dental anxiety have regular dental care. Secondly, moderate to high dentally anxious subjects visit the dentist on a regular basis and may, according to Milgrom (1985), be characterized as 'goers but haters'. However, individuals in both of these categories may be vulnerable in the sense that they probably can change their visiting patterns to the dentist. Why and what factors can change the balance to more avoidance are not clarified, but speculation may include a negative treatment experience such as extreme or unexpected pain, or more cognitive aspects such as poor communication between the care-giver and the patient. Despite their regularity of dental care, patients in these categories may benefit from specific dental anxiety treatment, so as to alleviate their vulnerability to a change in dental visiting habits. The third category includes patients with high dental anxiety or possibly border dental phobia and are partial avoiders. Such individuals may accept emergency treatments and sometimes conventional dental care, but on an irregular basis. Finally, the last category includes subjects that have full avoidance behaviour of dental care, i.e. they do not go to the dentist at all.

Clinical studies

Internationally there are a few specialized clinical centres that have been organized and characterized by both patient treatments and clinical research. The clinics have different experiences depending on when and where they were established. However, these clinics are and have been using a referral system for patients and thereby have described systematically the patients with regard to their high dental anxiety levels and importantly, their inability to tolerate conventional dental treatment. In addition, the patients are mostly characterized by avoidant behaviour to dental care indicating irregular visiting habits. Among these clinics are centres in Gothenburg, Sweden; Bergen, Norway; Amsterdam, Netherlands; and Seattle, USA. These research centres have had a large and important impact on the development of treatments for dental anxiety, the knowledge of how and to what extent factors concomitant to dental anxiety and phobia develop over time and their impact on patients' life situations. Avoidance behaviour of dental care associated with dental anxiety is clearly one of several important factors that research at these centres has been able to document. Keeping in mind that the patient groups have been and are special with regard to levels of dental anxiety and phobia, the range of avoidance time for dental care is estimated between 5 and 20 years among extremely dentally anxious patients or dental phobic individuals as reported from a variety of clinics and there is a clear and significant association between level of dental anxiety and length of avoidance (Aartman et al. 2000; Abrahamsson et al. 2003, Berggren 1984, De Jongh et al. 2011; Hakeberg et al. 1992; Moore, Brodsgaard and Birn 1991). A history of missed and cancelled dental appointments may be a reliable source to investigate if a person exhibits dental fear reactions. Avoidance of dental care plays an important role in escalating the manifestations and consequences of dental fear. It affects the level of dental fear, the magnitude of psychosocial effects and certainly most often the dental status (Berggren and Meynert 1984). For a majority of individuals with dental anxiety and an avoidance behaviour of dental care the deterioration of their dental health may progress over time at a different pace, but their awareness of the problem is definitely at hand and the size of the problem may also become a stigmata. Social pressure from surrounding family and friends and support may for some individuals reduce the level of avoidance (Berggren and Meynert 1984). Such pressure and support may also include other ways to conclude, e.g. dental care through treatment under general anaesthesia or sedation, thus using more expensive dental care.

Observational studies

There are many scientific publications during the past decades that show a statistically significant correlation between dental anxiety and avoidance of dental care among subjects in the general population (Hakeberg et al. 1992; Hägglin et al. 1996; Locker, Liddell and Burman 1991, Moore et al. 1993; Vassend 1993). Such associations are found both with regard to last visit to a dentist and regularity of dental visiting habits. Moreover, it has been shown that this relationship has a gradient, indicating that the higher the level of dental anxiety the longer the time of avoidance (Locker et al. 1991).

Oral health among individuals with extreme dental anxiety

Clinical studies

Surprisingly, the effects and consequences of severe dental fear and an avoidance behaviour on individuals' dental status have not been established thoroughly in earlier research, maybe due to an empirical and an expected obvious relationship.

Table 1.1 The difference in oral status in a clinical study (Hakeberg et al. 1993) including a group of dental phobic patients (N=90) and a group of ordinary dental patients (N=90). Mean numbers and standard deviations are displayed.

<i>Oral status</i>	<i>Dental anxiety group</i>	<i>Control group</i>
Missing teeth	4.4 (4.9)	2.5 (2.9)
Caries (surfaces)	19.5 (11.1)	7.9 (5.3)
Apical periodontitis	4.0 (4.7)	1.2 (1.6)
Marginal periodontitis (no. of tooth surfaces >4 mm)	5.0	1.0
Filled surfaces	8.1 (6.4)	13.1 (9.1)

Berggren and Meynert (1984) found in a group of extreme dental fear patients that the oral status was more deteriorated, with respect to decayed surfaces, missing teeth, apical lesions (mean number 37, 5, 4, respectively) and periodontal disease (on average, marginal bone loss $\leq \frac{1}{3}$ of the root length), than would be expected in ordinary dental patients of similar age group. This study did not include a non-anxious comparison group. Hakeberg et al. (1993) investigated the oral health in a group of patients with extreme dental anxiety and an avoidance behaviour of dental care. A control group of ordinary patients with regular visiting dental habits and accepting conventional dental treatment procedures were matched according to age, gender, marital status and housing standard and included in the analysis. The results of the study described a substantial difference in oral status between the groups. There were significantly more missing teeth, higher frequency of caries, apical periodontitis and proximal periodontitis among patients with dental anxiety (Table 1.1). However, the numbers of restored tooth surfaces were significantly fewer among the dentally anxious individuals.

In a similar dental fears clinic in Bergen, Norway, Agdal et al. (2008) examined dental phobic patients according to DSM-IV criteria with regard to their oral status. The patients (N=40) had extreme dental anxiety and had avoided dental care on average for 11.2 years. Mean missing teeth was about 2 (SD=3.5) and the mean number of teeth with caries was 6.7 (SD=4.3). There were differences between the above two studies, however, the oral status is clearly highly affected with regard to several measures on oral health and diseases. Patients attending special clinics for dental fear on a referral basis do have poor oral health and since the avoidance is a feature of the dental anxiety complexity there is a gradient of oral status with age. The older the patient the more worse the oral status is, as compared to younger individuals. Wide Boman et al. (2010) used a single group design with referred dental phobic patients who were examined with respect to their oral health. Results were similar to those in the previous studies with 3.4 (SD=4.0) and 8.1 (SD=5.2) for the mean number of missing teeth and decayed teeth, respectively. In the studies by Agdal et al. (2008) and Wide Boman et al. (2010) another outcome was analysed, namely the presence of root remnants. Such a feature may indicate a long-term period of avoidance of dental care and lack of a drive to even consider emergency treatment. In the Agdal et al. study nearly 40 per cent of the sample had one or more root remnants, while the figure was 57 per cent in the Wide Boman et al. study.



Figure 1.3 Two referred patients examined at a special dental fears and research clinic in Gothenburg, Sweden. These patients reported the same level of dental anxiety and the same time of avoidance of dental care. They were both in their early 20s when they were referred to the clinic. These cases indicate a wide spectrum of the relationship between dental anxiety and oral health status

Observational studies

In general, epidemiological studies reveal an obvious relationship between oral status and dental anxiety. Individuals with dental anxiety have more oral diseases than non-dentally anxious persons. In addition, studies also point towards a gradient in health inasmuch as the higher the dental anxiety levels the more negatively affected the oral health (Hällström and Halling 1984; Hägglin et al. 1996; Ng and Leung 2008). The differences are not typically large due to certain factors as compared to the clinical studies mentioned above. Thus, the fact that both dentally anxious individuals with or without regular dental visiting habits are included in these reports make a difference with regard to the oral status. Another possible explanation may be that subjects who have a phobia for dental care do not participate in epidemiological studies with the objective to examine oral health and diseases as well as being asked about their dental care behaviours and so forth. Such individuals could certainly belong to a non-participation or dropout group.

Some studies of observational character only reveal self-reported oral health in relation to dental anxiety levels. These publications also show a strong correlation between poor oral health and high dental anxiety even after adjustment for other potential risk factors and confounders (Meng et al. 2007; Pohjola et al. 2009). Also, other significant problems in relation to oral health such as toothache, gingivitis and chewing problems were more common in highly fearful individuals (Milgrom et al. 1988). The results in studies of individuals' self-reported estimates of their own oral health should, however, be interpreted with some caution with respect to actual oral status, since highly dentally anxious subjects may over report the deterioration of their oral health (Moore 1991).

Associations between dental anxiety and oral status have been indicated in a substantial number of epidemiological surveys. The majority of publications have a cross-sectional design while only a few reports have conducted longitudinal analysis. In one study from the 1970s by Lavstedt (1978) it was found that several oral health variables were affected by the degree of dental anxiety reported. It was shown that, in comparison with ordinary dental patients, subjects with dental anxiety on average had higher frequencies of missing teeth, caries, endodontically

treated teeth and a higher degree of marginal alveolar bone loss. Furthermore, women with dental fear were found to have more decayed surfaces and fewer filled surfaces compared to women with no dental fear. However, the reliability and validity of the measurements of dental anxiety was not clear in this study.

In a representative sample of middle-aged women, Hällström and Halling (1984) found that individuals with pronounced dental phobia had significantly more missing teeth and more marginal alveolar bone loss compared to women with no or low degree of dentistry phobia. Cohen (1985) reported on the association between dental anxiety and DMFS (Decayed Missing Filled Surfaces) status within a US naval population. It was found that male recruits with reported high dental anxiety had significantly more decayed surfaces than low anxious recruits. No significant differences were found with regard to missing or filled surfaces. It should be pointed out that the mean age of this single-sex population was low, with a relatively low rate of caries, which may be why differences in dental health have not emerged in full. In a study from Norway (Schuller, Willumsen and Holst 2003), the association between dental fear as measured by the Dental Anxiety Scale and several indicators of oral status was investigated. The authors found that dental fear was significantly correlated with higher number of decayed surfaces, decayed teeth and missing teeth; and a lower number of filled surfaces, filled teeth, functional surfaces and functional teeth. However, there were no significant differences with regard to the DMFT (Decayed Missing Filled Teeth) and DMFS indices and degree of dental fear. One conclusion of this report must be that since the separate parts of the indices methodologically counteract each other in relation to the outcome, different measures should be used while analysing the oral status among dentally anxious individuals. The aspect of functional teeth or surfaces is interesting since it reflects the number of filled and sound teeth which may be perceived as the ability to chew (function) and an aesthetical dimension (appearance). Moreover, the study had good external and internal validity with a large sample size and used reliable measurements indicating an important impact of dental fear on the oral health status.

In a large epidemiological and cross-sectional national survey in Finland, Pohjola et al. (2008) analysed the relationship between dental fear and dental conditions among over 6000 adult individuals. All dental health variables used in this study were significantly associated with high dental fear except number of restored teeth. The authors also revealed that there was a gradient between the number of decayed teeth and the odds ratio of having high dental fear. So, the odds ratio was 1.1 per decayed tooth for the outcome high dental fear, meaning that a person having 10 decayed teeth would have about 11 times higher risk of being highly fearful of dental care. This finding, according to the regression models, was estimated irrespective of age, gender, dental attendance and any interaction terms entered in the statistical model. Similar results were presented for the number of missing and sound teeth, albeit this association was age modified in a specific pattern. Typically, the younger a person the fewer teeth missing and the higher the dental fear. This correlation was reversed the older the individuals were. These findings may be interpreted as strange, but considering that highly fearful individuals avoid dental care during adolescence and young adulthood then dental treatment with extractions of teeth is less common as opposed to less fearful persons. Reasons for removal of teeth in that age group may of course be of orthodontic diagnosis and trauma. However, the older the individual, the higher the risk for longstanding caries lesions and eventually extraction of teeth. Such a development may be possible for individuals with high dental fear and irregular dental visiting habits and may explain the results in the study by Pohjola et al. (2008).

Another issue concerning oral health status among dentally anxious individuals is a possible gradient in level of dental anxiety related to a gradient in deteriorating oral status. A few scientific publications point towards such a relationship. Ng and Leung (2008) investigated the role of the degree of dental anxiety and effects on decayed, missing and filled teeth as well as periodontal disease as measured by the clinical attachment level (CAL) in a cross-sectional survey performed on 1000 adults living in Hong Kong. Their findings present a clear and significant relationship between level of dental anxiety and level of disease or status, the higher the dental anxiety the more affected negative oral status, even regarding periodontal disease. These results were modelled with regression analyses including adjustments for age, sex, smoking, education and income. However, as noted in previous studies, the number of filled teeth had an inversed relationship with fewer fillings in higher levels of dental anxiety. In a study from Australia, Armfield et al. (2009) presented data from a large cross-sectional, nationwide sample (N=5364) of adults concerning the association between dental fear, dental caries and periodontal indicators. Parallel results to Ng and Leung (2008) were found, but in contrast to the previous study Armfield et al. (2009) did not reveal a correlation between periodontal indices of clinical attachment level (severe-moderate periodontitis) or gingival index (gingivitis) and level of dental fear.

Some studies have used subjectively reported oral health in relation to dental anxiety. In general a clear majority of surveys find significant associations between dental anxiety and a poor self-perceived oral health. For example, Meng et al. (2007) evaluated in a telephone survey of adult individuals in Florida, USA the relationship between self-rated overall oral health and high/low fear and found an odds ratio of 0.43 ($p=0.004$) for the likelihood of having a good oral health, meaning that there was a statistically significant risk for high fear individuals to experience a poor self-perceived oral health. Pohjola (2007) showed in a logistic regression analysis model that perceived poor oral health and perceived dental treatment need were significant predictors of high dental fear with odds ratios of 2.0 and 2.3, respectively. In a further age-specific model it was revealed that the only age group that had perceived poor oral health in relation to high dental fear included individuals of 30–34 years of age. The other variable perceived treatment need was significant in the older age groups. These findings may indicate that younger dentally anxious individuals are more uncertain as to how their oral status actually is with regard to several aspects such as caries and periodontal disease, while a greater experience of one's own health and the 'true' status may be something that increases with age.

Psychosocial effects

As indicated by several studies another aspect of the consequences of dental fear and avoidance is the psychosocial effects that are seen among fearful dental individuals. The general opinion may be that for individuals with dental anxiety and possible irregular dental visiting habits only the oral health is affected. However, research has indicated other aspects and effects associated with dental anxiety, such as increased medication, abuse of alcohol and tranquilizers, low self-confidence and self-esteem, psychosomatic disorders and sick-leave from work (Berggren and Carlsson 1986; Berggren and Meynert 1984; Hakeberg et al. 1993; Locker 2003; Wide Boman et al. 2010).

Clinical studies

In a treatment study of severe dental anxiety patients at a specialized dental fears research and treatment clinic, Berggren and Meynert (1984) reported that a large proportion of the patients revealed feelings of negative appearance and active social withdrawal due to their estimated

deteriorated dental health. Thus, a more holistic perspective on dental anxiety and the effects on quality of life and health has been the object of some recent investigations. For persons with a history of avoidance of dental treatment for many years, reduction of dental anxiety and a normalized dental care behaviour may have important implications beyond actual benefits in dentistry. Berggren and Carlsson (1986) reported from a clinical treatment study of dental anxiety patients different positive side effects from specific treatments that reduced their dental anxiety. The patients stated less headaches and stomach problems and that they had decreased the abuse of alcohol and sedatives. The effects were significant, albeit more so with regard to the behavioural therapy compared to treatment under general anaesthesia. Hakeberg and Berggren (1993) showed that successfully treated dental anxiety patients significantly reduced their number of sick-leave days from work from before to after treatment. Berggren (1993) conducted a study on the psychosocial effects from dental anxiety in over 100 adult dental patients with avoidance behaviours. It was found that the patients reported a range of negative social life effects. Individuals who had avoided dental care for a longer period of time (>10 years) revealed more problems than did short-term avoiders. As measured by the Nottingham Health Profile the extreme dental anxiety patients in that sample scored high on the dimensions of emotional reactions and daily life effects. A majority had restricted their relations to other people, for example meeting friends only at work or in private, and even in their family situation. Also, feelings like loneliness or isolation, easily being upset and losing temper were prevalent in this group of patients.

According to the theoretical model of the vicious circle of dental anxiety patients have feelings of inferiority and embarrassment of their oral status and the non-ability to withstand regular dental care. Wide Boman et al. (2010) demonstrated these phenomena in a group of patients referred to a special dental fears clinic. The patients reported both negative emotional and social consequences due to their extreme dental anxiety. Effects revealed were that dental anxiety made them angry, ashamed and depressed. The social effects were interference with family relationships, intimate and friend relationships and their working life. These associations were even stronger for patients with higher scores on depression and general anxiety questionnaires.

Psychosocial effects may also be measured through oral health-related quality-of-life tests where psychological, social and physiological dimensions are captured in relation to oral health and diseases. In a clinical trial of cognitive behavioural treatment of intra-oral injection phobia patients, the authors found that quality-of-life aspects were lower among the phobic group compared to a non-clinical reference group (Agdal et al. 2011). Intra-oral injection phobic patients may in some aspects resemble dental phobic patients and the effects on oral health and life situations (Agdal et al. 2008; De Jongh et al. 1998). An important outcome of the study by Agdal et al. (2011) was that quality-of-life levels were normalized post treatment.

Observational studies

Several epidemiological surveys have investigated how dental anxiety may influence a broad variety of psychosocial dimensions. Different psychometric tests as well as single, global questions from questionnaires have been used to measure such associations. It was not until the 1990s that special targeted methods, tests or questionnaires were developed in the odontological sciences to capture psychosocial or health-related quality-of-life effects correlated to oral diseases and status. One of a few longitudinal epidemiological studies of adults with high dental anxiety in relation to mental health and personality factors has been published by

Hägglin et al. (2001). Among middle-aged women the authors were able to reveal that those who reported high dental anxiety over a 24-year period reported neuroticism (higher), extraversion (lower), more psychiatric impairment and social disability as compared with individuals with low/no dental anxiety. The same research group (Hägglin et al. 2000) reported on health-related quality of life and dental anxiety in women by using a cross-sectional design. The generic test, SF-36, was used to capture general functioning and well-being, albeit not directly aiming at oral status or health. The test is widely used in clinical trials as a subjective outcome assessing general health in a multidimensional scale, e.g. pain, social functioning, emotional problems and mental health. The authors found that having dental anxiety was predictive of lower levels of SF-36, meaning that the women with dental anxiety had significantly lower scores on all dimensions of SF-36. SF-36 was also retained in multiple regression analyses which adjusted for known risk factors for dental anxiety. Thus, high dental anxiety individuals had more symptoms related to physical function, pain, perceived general health, vitality, social function, emotions and mental health. An interpretation may be that high dental anxiety is related to symptoms and feelings that challenge a person's overall daily life situation in many aspects. However, a causal pattern cannot be inferred due to the study design. There are, however, other studies that support these findings. Locker (2003) investigated psychosocial consequences and psychological well-being (emotional health, self-esteem and morale) and their relationship to dental fear and anxiety when specifically taking into account levels of general anxiety. In general the results indicated a comorbidity of dental anxiety and high general anxiety relative to psychological well-being and psychosocial consequences in life situations. Over 93 per cent of the subjects in the study reported one or more psychosocial consequences due to their high dental anxiety. The subscales indicated experienced psychological problems (e.g. feeling foolish, being afraid of dental treatment), social relationships (e.g. *people tell me my fears of dental treatment are childish and ridiculous*), avoidance/social inhibition (e.g. *I hide my teeth when I laugh or smile and I am reluctant to meet new people because of the state of my teeth*). Moreover, dental anxiety predicted poor emotional health and psychosocial consequences up and above the significance of high general anxiety. This study implicates some very important clues to the interrelationships of dental anxiety and the consequences an individual may perceive with regard to daily life situations. The oral health and status then not only plays an important role concerning functions such as chewing, but definitely a significant role of psychological and social character. These findings indicate the impact of these factors in the theoretical model of the vicious circle of dental anxiety (Berggren 1984).

The above results are strengthened by some other scientific publications such as Mehrstedt et al. (2007), Ng and Leung (2008) and Pohjola et al. (2009). The first study by Mehrstedt et al. used the Oral Health Impact Profile (OHIP-14) to assess different aspects of oral health and impacts on life situations. When comparing dentally anxious subjects with a sample from the general population, the difference in oral health-related quality of life became very obvious with large deviations in median scores, indicating a substantial impact of dental anxiety on oral health and psychosocial factors. Specifically, the effects were strong regarding symptoms and function (pain, chewing capacity), as well as stress levels, self-consciousness, embarrassment and dissatisfaction with life. The Ng and Leung (2008) study showed similar results, but in addition revealed a gradient between dental anxiety levels and effects on oral health-related quality of life. The higher the dental anxiety reported the stronger functional and psychosocial effects as measured by the OHIP-14 on the participating individuals. In a large cross-sectional, national sample of the Finnish population dental anxiety and its correlation to OHIP-14 was

analysed. Being dentally anxious was estimated to increase the risk by 1.4 times of having subjective oral impacts. The dimensions affected significantly among the OHIP-14 items were similar to the report by Mehrstedt et al. (2007), i.e. pain, psychological discomfort, psychological disability, social disability and less satisfying life situation.

These observational studies further emphasize the relationship between dental anxiety and a wide range of psychosocial consequences, but also different symptoms from the mouth directly related to the frequency of having orofacial pain and a decreased functional oral capacity such as chewing and eating.

Cognitive and physiological negative effects associated with dental anxiety/phobia

What are the typical negative effects on cognitions and physiological responses associated with dental care for highly anxious individuals? Carlsson et al. (1986) tested a group of dental phobic patients before and after standard dental examinations and either systematic desensitization or premedication with a sedative. Muscle tension (EMG), heart rate (HR) and a palmar sweat index (skin conductance resistance, SCR) were measured. The outcome of the physiological variables did not show a clear pattern, displaying both positive and negative correlations to dental anxiety scores and change of scores after treatment. Higher mean SCR scores were shown after treatment, the same pattern was acknowledged in HR while EMG was reduced. The authors conclude that there is not a generalized change in physiological reactivity in a dental situation. Note that the study only included 15 subjects thereby typically violating a type II error. Hugdahl et al. (1984) evaluated cognitive and physiological symptoms among individuals with different simple phobias, including dental phobia. The most frequent and strong reactions were an increased heart activity and muscle tension while thinking of the dental situation. Higher levels of muscle tension and heart rate in dental phobic patients during video stimulation were demonstrated by Lundgren et al. (2001, 2004). Psychophysiological reactions during video exposure were compared between 126 dental phobic patients and a control group ($n=25$) of non-fearful individuals (Lundgren, Berggren and Carlsson 2001) and between dental and neutral video scenes (Lundgren, Berggren and Carlsson 2004). Interestingly, the skin conductance level (SCL) was consistently, although non-significantly, higher in the non-fearful group compared to the phobic group (Lundgren et al. 2001). Lueken et al. (2011) showed that higher level of dental fear was accompanied by higher SCLs during exposure to dental videos but not to exposure of other fear-relevant content (snakes). Several studies have supported that dental phobic individuals show an increase in heart rate during exposure (Elsesser et al. 2006; Johnsen et al. 2003; Leutgeb, Schafer and Schienle 2011; Lundgren et al. 2001; Mcneil et al. 1993; Schmid-Leuz et al. 2007). However, the relationship between dental phobia and heart rate is complex due to an overlap between dental phobia and blood-injection-injury (BII) phobia (De Jongh et al. 1998; Vika et al. 2008), where the later has been characterized by a diphasic response. The diphasic reaction starts with a transitory increase in heart rate and blood pressure, which is followed by a marked decrease in the heart rate and blood pressure which can lead to reductions in cerebral blood flow and eventually to fainting (Graham, Kabler and Lunsford 1961; Ritz, Meuret and Ayala 2010; Steptoe and Wardle 1988). According to the DSM-IV, which classifies dental phobia as a subtype of BII phobia, approximately three out of four patients diagnosed with BII phobia report a history of fainting in phobic situations. However, in a study by De Jong et al. (1998) only 37 per cent

of patients treated for dental phobia reported a history of fainting, which was equal to the proportion in patients diagnosed with BII phobia in the same sample. It is notable that 57 per cent of the patients with dental fear could also be diagnosed as having a BII phobia. Despite this overlap, the authors argued that dental phobia should be regarded as a separate condition, apart from BII, due to the fact that there was no significant relationship between dental fear measures and BII measures (De Jongh et al. 1998).

We know that among regular dental care visiting individuals there is a large proportion of highly dental anxiety subjects. How do these patients differ from individuals with avoidance behaviour of dental care with regard to cognitions and physiological symptoms relative to dental treatment? De Jongh et al. (1994) investigated a different set of cognitions for low and high dental anxiety subjects. The authors analysed 24 thoughts that people may have concerning dental treatments. The results showed that high anxiety patients had clear and significant higher proportions of cognitions on all but two items out of 24 possible statements. Those items were “*Going to the dentist is something one simply should do*” and “*Do I have to wait long before it is my turn?*”. Furthermore, there was a gradient in the number of negative cognitions to dental anxiety which in a regression analysis accounted for about 71 per cent of the variance, thus the more negative cognitions the higher dental anxiety.

There is a large number of studies showing that subjects with dental anxiety have negative thoughts about future dental treatment, which in turn create anticipatory anxiety and obvious physiological reactions, specifically autonomic arousal with increased heart rate, perspiration, muscle tension, nausea, gagging and even fainting (Armfield 2010b; De Jongh et al. 1994; Wardle 1984).

Conclusion

This chapter has discussed common and recognized symptoms, clinical characteristics and consequences that may be observed or reported by individuals with dental anxiety. Using the theoretical model of the vicious circle of dental anxiety presented by Berggren (1984) a broad range of factors with a major impact on individuals with dental anxiety has been revealed, specifically related to avoidance of dental care, deteriorating oral health, negative psychosocial effects, physiological arousal as well as negative cognitions. Berggren’s model has not been tested seriously since it was first published, but more recently two reports have analysed the concepts. Both publications have a cross-sectional design. Armfield et al. (2007) used an epidemiological survey in Australia, while the other report from the Netherlands (De Jongh et al. 2011) included individuals with diagnosed dental phobia. Armfield et al. (2007) concluded that their results were consistent with a hypothesized vicious circle of dental fear. Thus, high dental fear individuals had a pattern of more avoidance behaviour, worse oral health and more emergency treatment visits, compared to subjects with lower levels of dental anxiety, with a gradient in the frequency of problems. De Jongh et al. (2011) found support for the vicious circle of dental anxiety according to Berggren’s model to some extent, although certain paths of covariability were not found in their analyses. This may be partly due to the measurements used in the study. There is, however, one major dimension, i.e. the time axis, in the model or the successive model (Hakeberg 1992) that has not been evaluated. According to this model (Figure 1.4) the development of dental anxiety, avoidance behaviour of dental care, a deteriorating oral health and psychosocial consequences, including negative cognitions,

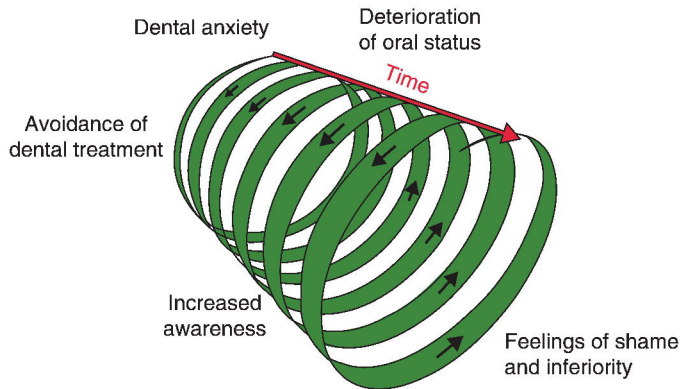


Figure 1.4 The vicious spiral of dental anxiety. Hakeberg 1992

will continue and develop over time, unless the vicious ‘spiral’ is broken at any given time for different reasons, e.g. referral to a special clinic, major social support from family and friends or other important life events.

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Background Description and Epidemiology

Magne Raadal and Erik Skaret

Background

Dentistry and dental treatment have always been associated with pain and anxiety, probably because treatment used to be extremely unpleasant and painful before the development of today's modern techniques and anaesthetics. However, despite the invention of new equipment and less unpleasant treatment techniques during the twentieth century, dental fear, anxiety and phobia are still serious problems affecting a significant part of the population and are among the most frequent fears in western countries (Smith and Heaton 2003).

Since dental avoidance and reduced oral health reflect the serious consequences of dental anxiety, an increased interest for research into this field has evolved during the last decade. From its origin within natural science, a growing sector of behavioural research is now emanating in dentistry. This research includes a variety of problems of importance for the quality of services delivered by the dental profession, such as general psychology, clinical communication, the patient–dentist relationship, dental fear and anxiety, patient satisfaction and quality of life.

This development also reflects the recognition of the soul and body as one biological entity, that somatic and psychological processes are integrated and thereby the great impact of fear and anxiety reactions on all aspects of health. This holistic view has also been important for the trend that oral health care is becoming more and more integrated in general health care, reflecting that the oral cavity is part of the body and its functions are based on the same biological processes.

Dental Fear, Dental Anxiety and Dental Phobia

Even though the terms 'fear', 'anxiety' and 'phobia' are frequently used interchangeably in the literature, it may be practical to define them separately in the clinical dental setting. For example, a distinction should be made between dental fear, a natural emotion usually seen

in small children, and dental anxiety and phobia, a disorder-like phenomena among more mature children and adults because the treatment approach (psychological and dental) should be different.

Fear is a normal emotional response to objects or situations perceived as genuinely threatening (Draper and James 1985). The response involves activation of the sympathetic branch of the autonomic nervous system, making the individual prepared for fight or flight, which is seen as a normal preventive reaction. Fear should therefore be considered as rational.

Anxiety has similar physical and behavioural components as fear, but it occurs without a present triggering stimulus. Anticipation of future events associated with previous negative experiences is frequently the reason. The response is irrational since there is no immediate threat, but it may be estimated as priming for a future fear response. In cases where the anticipatory anxiety reaction is strong and irrational, it may be regarded as a disorder.

Phobia is a clinical mental disorder according to the diagnostic criteria (DSM-IV or ICD-10). Among the criteria are: subjects display an extreme and persisting fear of clearly discernible objects or situations, avoidance behaviour and interference with daily life.

Consequences

The most obvious consequence of dental fear, anxiety and phobia is the avoidance of dental treatment. A number of studies has shown the relationship between dental anxiety problems and cancelled and missed dental appointments (Armfield, Stewart and Spencer 2007; Berggren and Meynert 1984; Skaret et al. 1999). Avoidance behaviour may have consequences for the patients' oral health with pain and deteriorated teeth (Figure 2.1) and patients with dental anxiety disorders generally have reduced oral health (Agdal et al. 2008; Berggren and Meynert 1984; Schuller, Willumsen and Holst 2003). Healthy teeth and regular dental visits are among the accepted norms in modern society and dentition is also an important aesthetic factor. Poor oral health and awareness of a dental avoidance problem may therefore give rise to embarrassment, reduced social functioning and possibly reduced quality of life (Berggren 1993; Crofts-Barnes et al. 2010; Locker 2003).



Figure 2.1 A 35-year-old male odontophobic patient with long-time avoidance of dental care

Measurement of Dental Fear and Anxiety

Before discussing the prevalence of dental fear, anxiety and phobia it is necessary to discuss how these concepts may be measured.

The multidimensional responses of dental fear and anxiety involve cognitive, emotional, behavioural and physiological components and measurement techniques try to evaluate all, or some, of these components. Many measurement techniques are in use, such as self-report questionnaires, behavioural ratings, physiological measures and projective techniques. Most population studies are based on self-report questionnaires (dental anxiety scales), which have been composed in an attempt to tap all components in dental fear and anxiety and tested for their reliability and validity characteristics. These instruments are also used by clinicians for screening purposes among their patients. Based on studies that have tested the construct validity of the scales, some of them have certain cut-off scores to define high dental anxiety or phobia. However, since the constructs of the existing scales vary greatly and none of them are considered perfect for tapping the multidimensional aspects of anxiety and phobia (Armfield 2010a, Newton and Buck 2000), the prevalence of dental fear, anxiety and phobia varies a lot in the literature.

The scales can be divided into *adult dental anxiety scales* and *child-specific dental anxiety scales*. Among the adult dental anxiety scales, the Dental Anxiety Scale (DAS) (Corah, Gale and Illig 1978) is the most widely used. It consists of four items, each of which the subjects rate on a five-point scale from A (calm) to E (terrified). The first two questions relate to the anticipation of having a dental appointment tomorrow and sitting in the waiting room, whereas the last two questions relate to anticipated fear of specific stimuli in the dental chair. The total score of the scale varies from 4 to 20. Corah et al. (1978) suggested a score above 13 as an indicator of high dental anxiety, but various cut-offs have been used in population studies as indicated in Table 2.2.

The Modified Dental Anxiety Scale (MDAS) (Humphris, Morrison and Lindsay 1995) is a modified version of the DAS scale, in which a fifth item related to the receipt of local analgesia is included. Since the alternative answers in the DAS differ among the questions, thus making them difficult to compare, the MDAS has the same answers for all questions in a clear order of anxiety: Not anxious – Slightly anxious – Fairly anxious – Very anxious – Extremely anxious. Fear of injections is an important factor in dental anxiety and phobia and the MDAS therefore seems to be an improvement compared to the DAS. However, the DAS scale is still the most extensively used.

The Dental Fear Survey (DFS) (Kleinknecht, Klepac and Alexander 1973) is the second-most common self-report measure of dental anxiety. The present scale (Kleinknecht et al. 1984) has 20 items reflecting a variety of symptoms of dental fear and anxiety. Two items focus on avoidance, five items are related to physiological arousal, 12 items assess fear of specific dental stimuli and the last item taps overall fear. In population studies the individual item scores are summed into a total score varying from 20 to 100. Cut-off for high dental anxiety has been suggested to be 60 or more (Milgrom, Getz and Weinstein 1988; Milgrom et al. 1990). In clinical use among individual patients the single items are used to help the clinician understand the type of fear.

The Index of Dental Anxiety and Fear (IDAF-4C) is a new theoretically derived instrument developed to measure a person's level of dental fear (Armfield 2010a, 2011b). The scale assesses emotional, behavioural, physiological and cognitive components of the anxiety and fear response and it is claimed to have a stronger theoretical basis than other scales.

The Dental Belief Survey (DBS) (Smith et al. 1987) is a 15-item instrument that assesses the patient's attitudes to dental personnel and dental treatment, e.g. to what extent they feel that the dentist is rushing, not listening to the patient and putting the patient down. A DBS score of 48 or more has been classified as high, meaning that the patient has a feeling of distrust of the dentist (Milgrom, Vignehsa and Weinstein 1992). A revised version of the scale, the Dental Belief Survey – Revised (DBS-R) containing 28 items, was later suggested by the same group of researchers (Milgrom, Weinstein and Getz 1995). Both scales have been evaluated and found to have good psychometric features. Results from a Swedish study point towards the use of the 28-item DBS-R since this scale measures an overall construct of patients' attitudes and feelings related to dentists and dentistry (Abrahamsson, Ohrn and Hakeberg 2009).

Among the variety of other self-report questionnaires for measuring dental fear and anxiety among adults, but not so frequently reported in the literature, is the Dental Anxiety Inventory (DAI) (Stouthard, Hoogstraten and Mellenbergh 1995). There are two versions, a full scale with 36 items covering three facets of dental anxiety (time, situation, reaction) and a short version with nine items (DAI-S). Good reliability and validity have been established for both scales (Aartman 1998; Stouthard et al. 1995). Also a number of single-item self-report measures of dental fear and anxiety have been published.

Among the child-specific dental anxiety scales, the Child Fear Survey Schedule – Dental Subscale (CFSS-DS) (Cuthbert and Melamed 1982) is by far the most widely used. The scale, which has 15 items scored on a Likert scale from 1 to 5, is a modification of the more general Child Fear Survey Schedule (CFSS) (Scherer and Nakamura 1968). The test is used in two versions: a self-report by the child version and a parental version. Different cut-off scores for high dental anxiety have been suggested. In a Swedish study among children aged 4–14 years, sum scores of 38 or more in the parental version were found to be associated with negative behaviour in the clinic (Klingberg 1994).

Behavioural rating is frequently used in child populations since behaviour management problems are so frequently linked to dental anxiety (Klingberg and Broberg 2007). The most commonly used is the Frankl scale (Frankl, Shiere and Fogels 1962), by which the behaviour is rated in one of four categories from 1 (definitely negative) to 4 (definitively positive). Examples of *projective scales* that are used among children are the Venham Picture Scale (Venham and Gaulin-Kremer 1979) and the Facial Image Scale (Buchanan and Niven 2002). *Physiological techniques* (e.g. heart rate, basal skin response, muscle tension) are usually restricted to specific test situations.

Prevalence

The prevalence of dental anxiety has been explored in a variety of populations and cultures during the last 30 years (for review see Klingberg and Broberg 2007; Smith and Heaton 2003). Results from the literature review by Smith and Heaton (2003), indicates stability in dental anxiety scores over time. They found neither a significant increase, nor a decrease in self-reported anxiety levels among US college students. The results from a great number of prevalence studies over time have indicated a similar situation in other parts of the world, even if few of the studies have presented time trends for dental anxiety based on comparable samples (Maggirias and Locker 2002; Thomson, Locker and Poulton 2000). The variations in use of instruments and cut-off points make these comparisons over time difficult (Armfield 2011b;

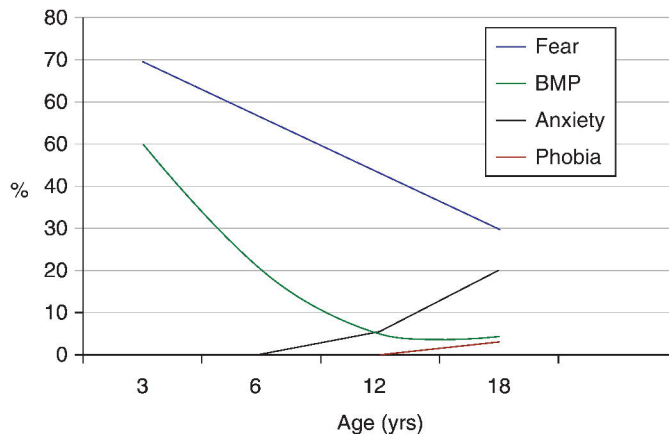


Figure 2.2 Estimated prevalence of dental fear, behaviour management problems (BMP), dental anxiety and dental phobia among children and adolescents. The curves are based on theory, except for the BMP curve which is from a Swedish study. Modified from Holst and Crossner 1987

Locker, Shapiro and Liddell 1996). However, one Norwegian study has showed reduced dental anxiety and dental attendance among 25 year olds in Norway from 1997 to 2007 (Åstrøm, Skaret and Haugejorden 2011). After controlling for potential confounding factors, the 25 year olds were 1.4 times more likely to report dental anxiety in 1997 compared to 2007. The decrease was largely attributable to lower mean DAS scores among higher educated females in 2007 than in 1997. Also, the discrepancy in dental anxiety between regular and non-regular dental attendees had decreased, largely attributable to a decline in dental anxiety among irregular dental attendees.

When discussing the prevalence of dental fear, dental anxiety and dental phobia, it is reasonable to discriminate between children/adolescents and adults. The reasons for this are two-fold: (i) children, and particularly preschool children, usually display normal fear reactions when exposed to new situations in the dental chair and these reactions should not be regarded as dental anxiety and (ii) dental anxiety and dental phobia usually develop over time through a vicious circle and are therefore most prevalent among adults (see Chapter 4). This is illustrated in Figure 2.2.

A more clear distinction should be made between dental fear/anxiety and dental behaviour management problems (BMP). Many dentists are likely to identify behavioural problems as identical to dental fear and anxiety, but this is not the case even if there is an overlap between them (Klingberg and Broberg 2007).

Children and adolescents

When children are placed in new and unprepared situations in the dental chair and feel that they may be subjected to painful procedures or other threats, they normally become fearful. The youngest and most inexperienced children are those who most likely will be fearful during dental procedures. But also adolescents and adults may be fearful in dental situations when exposed to procedures that they do not know whether they can master or not. These facts make it impossible to discriminate between normal fear and the

Table 2.1 Selected studies on the prevalence of dental fear and anxiety among children and adolescents.

<i>Authors</i>	<i>Country</i>	<i>N</i>	<i>Age group (years)</i>	<i>Instrument</i>	<i>Prevalence (%)</i>	<i>Comments</i>
Klingberg, Berggren and Noren 1994	Sweden	3204	4–6, 9–11	CFSS-DS	6.7	CFSS-DS score >37
Raadal et al. 1995	USA	895	5–11	CFSS-DS	19.5	CFSS-DS score >40
ten Berge et al. 2002	Netherlands	2144	4–11	CFSS-DS	6.0	CFSS-DS score >38
Wogelius, Poulsen and Sorensen 2003	Denmark	1281	6–8	CFSS-DS	5.7	CFSS-DS score >37
Bedi et al. 1992	Scotland	1076	13–14	DAS	7.1	DAS >15
Bergus et al. 1997	Russia	288	13–18	DAS	12.6	DAS >14
Milgrom et al. 1992	Singapore	1564	13–15	DFS	11.5	DFS score >59
Skaret et al. 1998	Norway	571	18	DFS	19.0	DFS score >59

Table 2.2 Select studies on the prevalence of dental anxiety in adult populations.

<i>Authors</i>	<i>Country</i>	<i>N</i>	<i>Age group (years)</i>	<i>Instrument</i>	<i>Prevalence (per cent)</i>	<i>Comments</i>
Locker, Liddell and Burman 1991	Canada	580	50–89	DAS	8.4	DAS ≥13
Hakeberg, Berggren and Carlsson 1992	Sweden	620	Adults	DAS	5.4	DAS ≥15
Vassend 1993	Norway	1288	Adults (>15)	DAS	4.2	DAS ≥15
Moore et al. 1993	Denmark	645	16–70+	DAS	10.2	DAS ≥12
				DFS, summary item	10.3	Somewhat afraid, much afraid, very much afraid
Hägglin et al. 1996	Sweden	1016	Females, 38–84	DAS	3.9	DAS ≥15
Thomson et al. 1996	Australia	1010	18–90	DAS	14.9	DAS ≥13
Eitner et al. 2006	Germany	374	Soldiers	DAS	13.2	DAS ≥13
Kirova et al. 2010	Bulgaria	746	18–82	DAS	29.9	DAS ≥13
Åstrøm et al. 2011	Norway	1190	25	DAS	16.7	DAS ≥13
Viinikangas et al. 2007	Finland	698	18–87	MDAS	8	MDAS ≥18
				Single question	12	Very scary
Milgrom et al. 1988	USA	1019	18–94	Single question	7.3	Very afraid or Terrified

disorder-like dental anxiety by use of the different measurement techniques. When presenting prevalence figures in the literature, the holistic term *dental fear and anxiety* is therefore most frequently used.

Table 2.1 presents some studies on the prevalence of dental fear and anxiety among children and adolescents (see also Chapter 6). The CFSS-DS questionnaire is most frequently used among the smaller children, whereas DAS and DFS are used among adolescents. As can be seen the prevalence varies from 5.7 per cent to 19.5 per cent among children below 12 years of age and from 5.7 per cent to 19 per cent among adolescents. When looking at the youngest children screened by CFSS-DS, the prevalence is rather stable around 6–7 per cent, except for the study in the USA in which children from low income families were surveyed (Raadal et al. 1995). This may be an indication of a higher prevalence in populations of lower socioeconomic and educational levels. In these studies a clear trend of decreasing fear with increasing age has been found and also that the prevalence among girls is higher than among boys. The large variations in prevalence among adolescents are probably due to the use of different instruments and cut-offs, but also a likelihood of true differences between populations from different countries. In studies where the relationship between dental fear and general fears has been examined, a positive relationship has usually been found (Klingberg and Broberg 2007).

Adults

When measuring dental fear and anxiety in adult populations by self-report instruments, it is more likely that the prevalence of *dental anxiety* rather than dental fear is evaluated. Most adults have previous experience of dental treatment and when answering the questionnaire they are therefore anticipating their reactions when faced with the stimuli in the situation more realistically than children. A typical patient with dental anxiety has fear reactions the day before a dental appointment, has problems sleeping the night before and may cancel or miss the appointment. When in the dental chair the person may exhibit typical fear reactions, such as sweating, restlessness and avoiding certain procedures.

Some studies on the prevalence of so-called high dental anxiety among adults, based on studies using self-report scales, are displayed in Table 2.2. Despite the fact that there are a number of self-report scales available for population studies, the great majority of such studies have used the DAS. However, even by the use of this same instrument, the variation in prevalence of high dental anxiety is large; from about 4 per cent to almost 30 per cent, as can be seen in Table 2.2. The use of different cut-off scores can explain some of these variations, but there are obviously real differences between populations.

A number of socio-demographic, behavioural and psychosocial factors have been related to dental anxiety (Berggren, Pierce and Eli 2000; Hittner and Hemmo 2009). Almost all studies show a higher prevalence among females than males, in some studies almost twice as frequent as in males. In two Norwegian treatment studies of patients with dental phobia (Vika et al. 2009) and intra-oral injection phobia (Haukebø et al. 2008) 65 per cent and 78 per cent, respectively, of the patients were females. Most studies have also found that the prevalence decreases after the age of 50 years, suggesting that high dental anxiety is built up during childhood and adolescence, is fairly stable during adulthood and decreasing in the older age range. There is also a strong relationship between dental anxiety, poor oral health and low dental treatment utilization, whereas there are conflicting findings about the relationship

between educational level, socioeconomic status and dental anxiety. Such factors may also influence the prevalence in population studies.

Dental phobia is a specific phobia according to DSM-IV. Typical for patients with this phobia are extreme fear of dental treatment, dental avoidance behaviour for a long time and poor oral health (Agdal et al. 2008; Berggren and Meynert 1984; Schuller et al. 2003). Since the patients are aware of the irrationality of the disorder, the phobia is also associated with shame, distress and reduced quality of life (Berggren 1993; Berggren and Meynert 1984; Crofts-Barnes et al. 2010; Locker 2003). The prevalence of dental phobia is obtained in population studies by the use of self-report questionnaires or interviews where the different criteria for phobia are included. An example of such a questionnaire is the Phobia Checklist which was validated for dental phobia against the Structured Clinical Interview for DSM-IV in a Dutch study (Oosterink, de Jongh and Hoogstraten 2009).

Only a few studies on the prevalence of dental phobia, based on DSM-IV criteria for specific phobias, have been published. The prevalence rates of dental phobia in these studies were 2.1 per cent in a Swedish population (Fredrikson et al. 1996), 3.1 per cent in a US population (Stinson et al. 2007) and 3.7 per cent in a Dutch population (Oosterink et al. 2009). In the survey among Dutch adults (Oosterink et al. 2009) dental phobia was the most prevalent among various subtypes of specific phobias. This study also included questions about the presence or absence of common fears (e.g. fear of dental treatment, injections, snakes, spiders, heights), as well as the severity of fears, and the fear of dental treatment was rated as having highest severity. The subjects were also asked to indicate whether they were bothered by intrusion; that is, re-experiences of a traumatic event that was hard to suppress. Dental treatment was by far the most prevalent among types of fears as 49.4 per cent of the subjects reported this type of intrusion. These findings support present views that previous negative experiences during dental treatment, involving pain and lack of control, is an important aetiological factor for dental fear, dental anxiety and dental phobia (see Chapter 4).

Conclusion

Dental fear, anxiety and phobia are prevalent problems in dentistry and frequently serious obstacles to oral health because of avoidance of dental treatment. Dental fear is most frequently seen among small and immature children when exposed to dental procedures that are unfamiliar to them, but also among adolescents and adults when exposed to new and challenging treatments that they do not know whether they can master or not.

Dental anxiety, when defined as a disorder-like condition illustrated by anticipatory fear and tendency of avoidance behaviour, occurs more frequently with increasing age among adolescents and adults. The prevalence in different populations varies between 4–30 per cent based on use of different screening instruments, age groups, ethnicity and culture (Tables 2.1 and 2.2). Females are more frequently affected than males and the prevalence decreases in the elderly population.

Dental phobia is a specific phobia according to the diagnostic manuals. Lifetime prevalence, based on screening instruments, is estimated to be between 2–4 per cent. Since the phobias usually need time to develop via a vicious circle (see Chapter 4), the phobia is most prevalent among adolescents and adults.

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Assessment of Dental Phobia and Anxiety

Kristin Haukebø and Margrethe Vika

Thorough assessment and accurate diagnostics are important for both clinical and research purposes. A correct diagnosis will aid in the construction of an appropriate treatment plan and in the long run, lay the groundwork for optimal treatment. In terms of the cross-disciplinary treatment plan for dental phobia, a psychologist performs the diagnostics and the dentist undertakes the phobia treatment. The criteria for phobias in general and specific phobia in particular have changed over time and with new editions of both the American and European diagnosis manuals. In the first edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) (APA 1952), specific phobia was categorized under ‘phobic reaction’, then ‘phobic neurosis’ in DSM-II (APA 1968), ‘simple phobia’ in DSM-III (APA 1980) and finally as ‘specific phobia’ in DSM-IV (1994).

Currently there are seven criteria that must be met in order to qualify for the diagnosis ‘specific phobia’ (300.29) in DSM-IV: The core characteristic of a specific phobia is a considerable and persistent fear in response to the presence or anticipation of a specific object or situation (Criterion A). Exposure to this stimulus will almost always evoke an immediate anxiety response (Criterion B). The individual recognizes that the fear is unreasonable or excessive (Criterion C). The phobic object/situation is either avoided or endured with strong anxiety (Criterion D). Clinical impairment must be present: The fear, anticipatory anxiety or avoidance behaviour must interfere with the person’s social or occupational functioning or daily routines, *or* there is considerable distress about having this phobia (Criterion E). In adults there is no requirement concerning duration but in individuals under the age of 18, the phobia must have lasted for at least six months (Criterion F). Finally, the symptoms cannot be better explained by any differential diagnosis (Criterion G). One must be aware that, in children, the anxiety and panic may manifest itself as anger, crying, clinging or freezing behaviour. They may also not be able to recognize that the fear is excessive or unreasonable.

In the diagnostic manual of the World Health Organization: *International Classification of Disorders* (ICD-10) (1992) specific phobias are labelled under F40.2 Specific (isolated) Phobias. Only three criteria are outlined in ICD-10 versus seven in DSM-IV. It states that the individual's symptoms must represent 'primary manifestations' of anxiety rather than being symptoms of obsessional or delusional thought (a). Second, the anxiety must be circumscribed to a particular situation or object (b) and there must be avoidance whenever possible (c). This means that DSM-IV and ICD-10 differs in that the DSM-IV includes the role of anticipatory anxiety, degree of anxiety, recognition by the patient of excessiveness or unreasonableness of the fear and the impact the phobia must have on a person's life in order to qualify for a diagnosis.

There are five subtypes in the DSM-IV: animal, environment, blood-injection-injury (BII), situational and 'other'. In DSM-IV, dental phobia is categorized as a part of BII, since dental treatment is regarded as a medical procedure. The ICD-10 does not purposely state any subtypes.

Differential Diagnoses

The most relevant differential diagnoses for dental phobia are the other anxiety disorders: panic disorder with agoraphobia (F40.01/300.21); social phobia (F40.1/300.23); post-traumatic stress disorder (PTSD) (F43.1/309.81); and obsessive-compulsive disorder (F42/300.3). It is also essential to assess the BII phobia in its totality, of which dental phobia is a subcategory. In order to assess differential diagnoses, questions should be aimed at exploring which stimuli provoke fear, why the patient feels anxious or avoids the dental situation, and it can be helpful to include how the fear developed.

The unifying core emotion of these disorders is anxiety. The anxiety is circumscribed to specific objects or situations. Post-traumatic stress disorder is the only disorder that represents a fear of something that has happened in the past.

In a *dental phobia*, common negative cognitions are that the pain from the dental procedure will be so strong that it is experienced as intolerable; loss of control in the dentist's chair; being subjected to negative behaviours from the dentist; being embarrassed in the treatment situation; and finally being subjected to serious treatment errors from the dentist (De Jongh, Aartman and Brand, 2003).

In *intra-oral injection phobia*, the focus is on the injection itself. Common fears are intolerable pain, dying from this pain, dying for some other reason due to the injection; going insane; bodily harm; and finally that the pain from the injection will become continuous (Öst et al. unpublished manuscript). This phobia differs from dental phobia as these patients would be fine if dental treatment could be done without the need for anaesthetic injections and only fear what could happen as a consequence of an intra-oral injection.

In *extra-oral injection phobia*, the primary fear is that one will experience such strong pain from the needle that one cannot stand the pain and lose control. Furthermore, these patients often fear that the injection or venipuncture will lead to permanent body damage, e.g. they will become ill or die from the injection, the vein will not stop bleeding. This differs from dental phobia in that injection phobics fear injections anywhere on the body but do not fear the typical dental stimuli.

In *blood phobia*, the primary fear is fainting. Cognitions related to fainting are: losing control (of one's bodily functions); never waking up; losing one's memory; and brain damage. The

secondary fear is usually falling, being hurt and feeling pain because of that and that the wound will not heal and, thus, one would bleed to death. The blood phobics may also fear fatal consequences of fainting. The blood phobia can generalize and comprise situations concerning venipuncture, receiving injections and so on. This condition differs from dental phobia in that blood phobics fear fainting when exposed to blood stimuli and usually do not fear typical dental phobic fear stimuli.

The primary fear in *claustrophobia* is to be in an enclosed space and being unable to leave the situation when an anxiety reaction is experienced. This condition is different from dental phobia in that claustrophobic patients are fine with dental treatment as long as they can leave the situation when they find it necessary. They do not fear the typical dental stimuli.

In *social phobia*, the individual would be most concerned with the dentist's or other personnel's evaluation of him or her, especially if symptoms of anxiety could be detected. Thus, social phobics differ from dental phobics in that they do not fear the dental treatment stimuli but that the dental situation may become embarrassing if they cannot comply or if they show anxiety reactions.

In *panic disorder with agoraphobia*, the patient will be most afraid of having an unexpected panic attack and not being able to escape and/or carry out safety behaviours (idiosyncratic behaviours which reduce anxiety in the short term but maintain the disorder in the long run). This differs from dental phobia in that these patients do not fear the typical dental fear stimuli and will be fine as long as they know that they can leave the dentist's chair if a panic attack occurs.

In *obsessive-compulsive disorder* (OCD), obsessions and compulsions can involve various themes. If the main theme is fear of contamination, this may translate to the dental treatment setting as well. OCD patients do not fear, however, the typical dental phobic fear stimuli. They are fine with dental treatment as long as they are convinced that they will not be contaminated by them.

In *post-traumatic stress disorder* (PTSD) one's primary fear is linked to an event in the past. This disorder can manifest itself with difficulties receiving dental treatment, especially if the trauma concerns the mouth as in some forms of torture or molestation.

Assessment Tools

Any assessment of dental phobia should focus on assessing the severity of the anxiety (subclinical or clinical levels), and possible differential diagnoses in order to help the therapist arrive at an idiosyncratic functional analysis of the phobia. A functional analysis contains a description of which situations/stimuli represent danger to the patient and the maintaining factors (e.g. belief in catastrophic cognitions and avoidance behaviours). The level of anxiety can be assessed in various ways and the most relevant ones will be described in this section. Some of these are applied mostly in a research setting and others mostly clinically.

Behavioural and physiological assessments

A graded behavioural approach test before and after treatment is probably the measurement of best ecological validity and which can clearly illustrate what a patient is able to do in terms of dental treatment. This type of assessment is probably used mostly in a research setting but

could represent a powerful assessment tool as well as a source of mastery for the patient when used after the phobia treatment is completed. This test should be performed by someone other than the treating dentist. Such a test can, for example, begin with entering the dental treatment room and end by filling a cavity (e.g. Haukebø et al. 2008). This measure has only been used in five randomized controlled trials (RCTs) so far (Gauthier et al. 1985; Haukebø et al. 2008; Jerremalm, Jansson and Öst 1986; Mathews and Rezin 1977; Wroblewski, Jacob and Rehm 1978).

Clinically, a structured rating of the patient's overt behaviour during dental treatment by the treating dentist can easily be included. A scale such as the Dental Operatory Rating Scale (DORS; Kleinknecht and Bernstein 1978) can be utilized. This scale quantifies the patient's activity according to general activity, specific activity (e.g., movement of arms, hands, feet and head) and postural status. Only three RCTs have utilized such a measure (Berggren and Linde 1984; Getka and Glass 1992; Jerremalm et al. 1986).

As anxiety is rooted in, and thus accompanied by, a wealth of psychophysiological responses, the level of anxiety can be assessed by changes in these. Mostly used in a research setting, five RCTs have utilized such methods (Getka and Glass 1992; Jerremalm et al. 1986; Lundgren, Carlsson and Berggren 2006; Miller, Murphy and Miller 1978; Thom, Sartory and Jöhren 2000). Measures of skin conductance, heart rate and electromyographic response are most widely utilized.

Structured clinical interviews

None of the above measures are used as diagnostic tools but rather supply supplementary information pre- and post-treatment. To date, the two most commonly used semi-structured interviews within the field of anxiety disorders, which arrive at a diagnosis, are the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al. 1996) and the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo and Barlow 1994; DiNardo, Brown and Barlow 1994). These are also the diagnostic interviews of choice for dental phobia.

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)

This interview assesses many of the Axis I disorders in DSM-IV. It comes in a research version (patient and non-patient) and a clinical version which is shortened for use in clinical settings. Current diagnoses are assessed as well as the lifetime prevalence for a few of them. One can use the section concerning the anxiety disorders to arrive at the diagnosis of specific phobia and at the same time achieve an evaluation of relevant differential diagnoses: panic disorder with agoraphobia, social phobia, obsessive-compulsive disorder and post-traumatic stress disorder. It divides the severity of the phobia into three categories (mild, moderate and severe), as well as the course of the disorder (partial remission, full remission and fully restituted). Lobbstaël, Leurgans and Arntz (2010) found moderate to excellent inter-rater reliability for the Axis I disorders. Williams et al. (1992) showed good test-retest reliability and acceptable inter-rater agreement concerning lifetime prevalence and current prevalence of the disorders. In terms of validity, there are studies showing superior validity of the SCID over standard clinical interviews at intake episode (Ramirez Basco et al. 2000; Fennig et al. 1994; Fennig et al. 1996; Kranzler et al. 1995; Kranzler et al. 1996).

Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV)

This semi-structured interview assesses the presence of DSM-IV anxiety disorders. There are two versions of the ADIS-IV available: a standard version assessing the current diagnoses and a lifetime version assessing both the current and lifetime prevalence of the diagnoses. It provides dimensional ratings of 17 situations/objects connected to specific phobias and 13 situations for social phobias. ADIS-IV also gives important information for a functional analysis of the anxiety disorders; more so than the SCID-I. Sections screening for mood, substance and somatoform disorders are included due to high comorbidity rates with specific phobias. Finally, there are sections covering the patient's medical and psychiatric treatment history. Good-to-excellent inter-rater reliability has been found for current and lifetime diagnoses, especially specific phobia (Brown et al. 2001).

The SCID-IV as a whole provides a broader assessment than the ADIS-IV but the latter yields more detailed information of each of the anxiety disorders including functional analyses, in addition to including the assessment of comorbid disorders (Antony and Barlow 2011).

Dental Fear Interview

The Dental Fear Interview (Vrana, McNeil and McGlynn 1986) is a 10-item structured, clinician-administered interview. Psychometric properties were tested by Vrana et al. (1986), finding that inter-rater reliability was adequate even with minimally trained interviewers, as well as adequate concurrent and discriminant validity. The interview touches upon topics such as subjective reactions and thoughts about dental treatment, duration since last treatment, avoidance and degree of impairment, for example, 'What is going to the dentist like for you? How does it feel?' and 'Have you avoided going to the dentist in the past because of fear or anxiety?'

Self-report scales

In the clinical setting, as well as in research settings, self-report questionnaires of dental anxiety are frequently used. They cannot replace diagnostic interviews, but they can be useful supplements and when used alone, give indications of the level of anxiety (clinical or subclinical levels). Following is a discussion of the most utilized instruments. Of the seven criteria in DSM-IV, there are more self-report scales that measure criteria A (circumscribed situation/object), B (degree of anxiety) and D (avoidance) than criteria E (impairment) and G (differential diagnoses) (Kent 1997). All of the following measures have been found to be psychometrically satisfactory with indicators of reliability in time and/or between raters and validity ranging from adequate to excellent.

Dental Anxiety Scale

The Dental Anxiety Scale (DAS; Corah 1969) is psychometrically evaluated for initial screening of extreme dental fear (Moore, Berggren and Carlsson 1991). It consists of four items rated on a five-point Likert scale ranging from lowest fear to highest fear, yielding a sum score from 4 to 20. A score of 15 or greater indicates severe dental anxiety. The four questions ask the patient to grade his or her anxiety level in relation to proximity in time and space in regards to dental treatment (e.g. thinking of going to the dentist tomorrow, sitting in the waiting room, waiting in the treatment chair). Good reliability and validity has been established (Corah, Gale and Illig 1978). It is widely utilized in clinical settings. This may be linked to the fact that it is quick to complete. The scale is translated and validated in numerous languages.

Dental Anxiety Scale-Revised

The Dental Anxiety Scale-Revised (DAS-R) (Ronis 1994) is a revised version of the original DAS. It was developed because the original version was seen as outdated in its written formulations. The wording in the revised version (Ronis, Hansen and Antonakos 1995) represents a more contemporary view of oral health care practice, acknowledging the roles of dental hygienists and female dentists. The third question has been changed to be gender neutral and the last question refers to either the dentist or the dental hygienist. The responses are still scored along a five-point Likert scale ranging from 4 to 20, with 15 indicating severe dental fear. Ronis et al. (1995) found that the mean scores, variances and reliabilities of the original and modified versions were equivalent. Cronbach's α -coefficient was 0.82, indicating adequate reliability and the scale was found to be internally valid (Ronis 1994). The Pearson correlation between the original and revised scales was .98.

Dental Fear Survey

The Dental Fear Survey (DFS; Kleinknecht, Klepac and Alexander 1973) measures anxiety to specific stimuli in the dental treatment situation (e.g. the drill, the smell, various aspects of dental treatment), typical autonomic responses in this situation (muscle tension, sweating, trouble breathing, nausea, increased heart rate) and avoidance behaviour (e.g. postponing scheduling or cancelling sessions/not turning up). One item asks for overall fear. It consists of 20 items, rated on a five-point Likert scale, yielding sum scores from 20 to 100. A score of 60 or higher indicates a high degree of anxiety (Milgrom et al. 1988; Milgrom, Vignesh and Weinstein 1992). It has been psychometrically evaluated and translated into numerous languages. Good reliability, validity and treatment sensitivity has been established in college students as well as in general and fearful dental patients (e.g. Schuurs and Hogstraten 1993).

Dental Anxiety Inventory

The Dental Anxiety Inventory (DAI; Stouthard 1989) gives a comprehensive measurement of the severity of dental anxiety. It comprises of 36 items which are rated along a five-point Likert scale from 'totally untrue' (1) to 'completely true' (5). Scores range from 36 to 180. Typical items are: (1) I become nervous when the dentist invites me to sit down in the chair; (22) In the waiting room, I sweat and freeze when I think of sitting down in the dentist's chair; (24) I already feel nervous at home when I know the dentist is going to give me an anaesthetic; and (36) I sleep badly the night before I have to have a tooth extracted. Factor analyses have shown a 'general dental anxiety' factor which comprises time, situation and reaction facets (Stouthard, Hoogstraten and Mellenbergh 1995). Good reliability (Cronbach's $\alpha=0.97$) and construct validity are established (e.g. Rowa, McCabe and Antony 2008; Stouthard et al. 1995). It has been translated into numerous languages.

Short Dental Anxiety Inventory

The *Short Dental Anxiety Inventory* (S-DAI; Stouthard et al. 1995) contains nine items of the original DAI. Answers are scored along a five-point Likert scale, total score range from 9 to 45. The scale is divided into three main areas: fear-provoking situations (including drilling, anaesthesia, extraction), time elements and reactions. An example is, 'I become nervous when the dentist invites me to sit down in the chair'. Research has found good reliability (Cronbach's $\alpha=0.88$) and construct validity (Aartman 1998).

Dental Cognitions Questionnaire

The *Dental Cognitions Questionnaire* (DCQ; De Jongh et al. 1995) assesses the frequency and believability of 38 negative cognitions associated with dental treatment. It is divided into two sections of which the first 14 questions assess negative beliefs related to dentistry in general and the next 24 statements focus on negative cognitions during treatment. It is a dichotomous scale on which the subject answers Yes or No to each item. The Yes items are counted towards a 'total negative cognitions' score ranging from 0–38. The degree to which the subject believes each statement *at that time* (from 0–100 per cent) is also recorded, yielding a mean 'percentage believability' score. Examples of self-reported predictions in the waiting room are: 'My teeth might break' and 'I become sick'. Self-reported predictions from the dental chair are: 'The dentist will drill in my tongue, gums and cheek' and 'I am helpless'. Good test–retest reliability and high internal consistency and satisfactory concurrent validity, in addition to treatment sensitivity, are established (De Jongh et al. 1995).

The Dental Beliefs Scale-Revised

The Dental Beliefs Scale-Revised (DBS-R; Milgrom, Weinstein and Getz 1995) measures the patient's attitudes to dental personnel and dental treatment in three main areas: professionalism, communication and lack of control (Milgrom et al. 1985; Smith et al. 1987). The original DBS contained 15 items and the DBS-R was increased to 28 items. Professionalism relates to topics such as the patients' concerns about the technical competency of the dentist and the dentist's integrity. Communication assesses the patients' experience of communication with the dentist. 'Lack of control' concerns the patients' experience of control or lack thereof during treatment. The 28 items are rated on a five-point Likert scale. Sum scores range from 28 to 140, the higher the score, the more negative cognitions. To illustrate, some items are: 'I am concerned that the dentist recommends work that is not really needed' and 'I believe that dentists don't have enough empathy for what it is really like to be a patient'. The scale has been psychometrically evaluated in several different languages and good reliability (α coefficient=0.96 in Coolidge et al. 2005) and construct validity have been found.

Index of Dental Anxiety and Fear

The Index of Dental Anxiety and Fear (IDAF-4C+; Armfield 2010) consists of four modules: a 'Base module' of eight items; a 'Phobia module' (five items); a 'Stimulus module' of 10 items; and finally an eight-item DAF module (IDAF-4c). The last module is based on the DSM-IV diagnostic criteria and comprises the cognitive, emotional, physiological and behavioural aspects of the fear and anxiety response. It contains eight statements whose answers are scored on a five-point scale from 'disagree' (1) to 'strongly agree' (5). Full-scale scores can be obtained by either summing the item scores (range: 8–40) or by obtaining the average of the items scores (range: 1–5). The IDAF-4C has high internal consistency (Cronbach's α =0.91), good test–retest reliability (r =0.82) and has demonstrated concurrent and predictive validity (Armfield 2010).

Dental Coping Strategy Questionnaire

The Dental Coping Strategy Questionnaire (DCSQ-20; Bernson, Elfström and Berggren 2007) is a 20-item self-report scale which assesses the patient's coping strategies in the dental treatment situation. It is adapted from the original Coping Strategy Questionnaire (CSQ) (Rosenstiel et al. 1983). Answers fall on a seven-point Likert scale from 0–6 (never–always). Factor analyses have

yielded four factors: 'self-efficacy', 'self-distracting and distancing', 'catastrophizing' and 'praying and despair' (Bernson et al. 2007). An example of a self-efficacy statement is: 'I tell myself I can't let my fear stand in the way of what I have to do'. An example of self-distracting statement: 'I try to feel distant from the treatment, almost as if I were somewhere else'. Furthermore, 'I worry all the time whether my fear will go away' is an example of catastrophizing and finally 'I pray that the fear will soon be over' is an example of praying and despair. Sufficient reliability (Cronbach's α for factors: 0.68–0.78) and discriminant validity have been found.

Level of Exposure-Dental Experience Questionnaire

The Level of Exposure-Dental Experience Questionnaire (LOE-DEQ; Oosterink et al. 2008) is a 23-item self-report scale assessing the severity or degree of aversive exposure experienced either in or outside of the dental setting. It was constructed in order to better understand the development of dental phobia from a conditioning perspective. Its authors intended to fill a gap in the assessment literature of dental anxiety by systematically taking the frequency of traumatic or distressing past events into consideration. Factor analyses revealed a four-factor solution of the scale: (1) Dentist's behaviour and patient's emotions, e.g. 'Have you ever been exposed to an event during which a dentist criticized you?'; (2) Distressing dental procedures, e.g. 'Have you ever been exposed to an event during which you had a tooth drilled which caused extreme pain or other severe distress?'; (3) Other distressing dental events, e.g. 'Have you ever been exposed to an event during which you were exposed to frightening or horrific stories about dental experiences?'; and (4) General traumatic events, e.g. 'Have you ever been exposed to an event during which you were victim of a violent crime?'. The answers are scored on a dichotomous scale 0 (never) or 1 (always) yielding an overall score ranging from 0–23. There is no cut-off score. Oosterink et al. (2008) found that the scale possessed sufficient internal consistency (Cronbach's α varied from 0.69 to 0.85) and satisfactory test-retest reliability (0.78), as well as adequate predictive, concurrent and discriminant validity.

Dental Visit Satisfaction Scale

The Dental Visit Satisfaction Scale (Corah et al. 1983) is a 10-item scale, assessing the patient's satisfaction with a dental visit, which can be divided into three subscales: Understanding–Acceptance (e.g. 'After talking with the dentist, I know what the condition of my mouth is'); Information–Communication (e.g. 'I felt that the this dentist really knew how upset I was about the possibility of pain'); and Technical Competence (e.g. 'The dentist seemed to know what he was doing during my visit'), in addition to an overall measure of satisfaction, all in the context of a specific dental visit. Corah et al. (1983) found satisfactory internal consistency (Cronbach's $\alpha=0.92$) and construct validity. Similar results were found by Hakeberg et al. (2000).

Medical Fear Survey

The Medical Fear Survey (MFS; Kleinknecht et al. 1999) assesses the severity of medically related fears in a 50-item self-report survey. Five subscales have been derived from factor analyses: fear of injections and blood draws; sharp objects; examinations and symptoms; mutilation; and blood (Kleinknecht, Thorndike and Walls 1996). Rating is performed on a five-point Likert scale from 0 (no fear) to 4 (terror), ranging from 0 to 200. Typical items are 'How much fear or discomfort would you experience from observing a surgical amputation?' 'How much fear or discomfort would you experience from seeing a mutilated body on TV?' Good reliability and validity have been found (Kleinknecht et al. 1999).

Future Developments

The fifth edition of DSM will be published in May 2013 and ICD-11 is thought to be due in 2015. Greater changes are expected in the DSM-V compared to the ICD-11. In the former, the wording and the ordering of the criteria for specific phobias will be changed in order to be consistent with other anxiety disorders. DeJongh et al. (1998) proposed making dental phobia a distinct subtype, but in their review they found more similarities than differences when comparing dental fear with BII phobia. The DSM-V Working Group on the anxiety disorders will therefore suggest that dental phobia is still categorized under BII. As the diagnostic criteria change, it is likely that the available assessment batteries will be revised and new ones, especially self-report measures, will be developed. The instruments described in this chapter are of such psychometric standard and many were translated into numerous languages, that they will continue to represent sound measurements of dental anxiety in the future.

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Aetiology of Dental Phobia

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Introduction

In order to understand the aetiology and development of dental fear and phobia it is relevant to consider psychological and interpersonal aspects of the dental consultation that may affect the patient's appraisal, feelings and coping in the situation. Theories of how fear reactions are provoked and how individuals cope with facing fearful situations are also important.

Psychological and Interpersonal Aspects of Dental Treatment

Considering the possibilities for real danger, dental treatment should not be especially threatening. However, taking different aspects of dental treatment into consideration, there is reason to believe that dental treatment triggers instinctive survival mechanisms. Darwinian theory indicates that the ability to learn fear may be part of an evolutionary process and that situations that threatened survival in the past are more readily learned to be fearful even today (Nesse and Williams 1994; Marks 1987). In this context, aspects of dental treatment, as well as other medical procedures, may trigger the basic survival mechanism of the fight-or-flight response in the sense that they include sharp objects causing potential pain and bodily damage (e.g. Bracha 2004, 2005; Bracha et al. 2006).

Another aspect of dental treatment is the threatening body position and potential obstruction of free air space during treatment. The dentist often has to perform operations on soft and mineralized human tissue with a high demand for precision. To be able to perform this work, the dentist must have a convenient field of work with good lighting and possibilities to reach any pathological tissues with adequate instruments. This may require a bodily position that is difficult for the fearful patient to accept.

Another essential feature of dental treatment is the intimacy of the oral area. Most people experience shyness when strangers or even acquaintances come too close. In a personal conversation the proper distance between two people is about 1–1.5 metres (Chambers and Abrams 1986). If anyone approaches closer than this, a feeling of unpleasantness or stress easily arises and a defence reaction (e.g. stepping back to reach a comfortable distance) is often observed. To provide dental treatment the dentist must operate within this zone of intimacy.

The mouth has several basic physiological functions. Throughout childhood we experience different kinds of taste. Our taste organs are responsible for identifying food elements and are involved in decision making concerning whether food should be swallowed or expectorated. And patients with enlarged adenoids or other obstructive conditions in the nasopharynx or respiratory system are especially vulnerable to feelings of obstruction of free air space. It is a normal response to react with fear if one feels that these basic functions are threatened.

Pain

Dental tissues are highly innervated with pain receptors and almost any dental operation is likely to cause pain in some patients. In spite of recent developments in local anaesthesia and dental equipment and in spite of the trend for less extensive removal of tooth substance, most people experience dental treatment as unpleasant. In a study of a representative sample of the Norwegian adult population, about 20–30 per cent reported their last dental visit as moderately painful or worse and 60 per cent reported having had at least one very painful experience (Vassend 1993). In an Australian study 44–48 per cent of an epidemiological sample reported having experiences of intense pain or considerable discomfort during dental treatment (Armfield 2010). It is a general clinical observation that local anaesthesia is less effective in patients who suffer from extreme fear reactions than in relaxed and confident patients (Fiset et al. 1989; Kaufman, Weinstein and Milgrom 1984) and it may be speculated that fear reactions make the effect of local anaesthesia less potent. Another hypothesis may be that patients for whom it is difficult to achieve adequate anaesthesia (e.g. due to anatomical variations in the mandible) develop dental anxiety mainly for this reason.

The correlation between remembered experiences of pain and dental anxiety is well documented. In one experiment a group of patients with high dental anxiety anticipated more pain during treatment than a group of patients without dental anxiety (Kent 1985). Immediately after treatment, the experience of dental pain was almost the same for the two groups. After three months the patients rated their memory of pain during the dental treatment. The patients with dental anxiety remembered the treatment as being more painful than the patients without dental anxiety. Several retrospective studies have found that patients with dental fear report previous painful dental experiences more often than patients with no dental fear (Bergius et al. 1997; Davey 1989, Vassend 1993; Wright, Lucas and McMurray 1980). It is uncertain whether these reported experiences of pain are cognitive appraisals due to anxiety, or whether the patients actually have experienced more painful episodes during dental treatment. In an experimental study by Bradley, Silakowski and Lang (2007) it was found that individuals reporting high dental fear showed larger and faster startle responses during anticipation of a painful stimulus.

Control

Dental treatment involves some degree of stress in all patients. Experiments have demonstrated that when test subjects feel that they have control over a stressful setting (whether they actually have this control or not), the responses to stress are reduced (e.g. Law, Logan and Baron 1994; Thompson 1981). In the perspective of perceived control it appears important to understand the reason for the event that causes the reaction (Folkman and Lazarus 1984). The dental setting can be very strange for the patient. Without a clear and realistic explanation of the different sequences in dental treatment and the consequences of not being willing to accept treatment, it may be difficult for the patient to understand and accept treatment. Small children do not understand the reasons for dental treatment and the consequences of not receiving treatment. This may be a component in the development of dental anxiety.

In a study by Logan et al. (1991) patients with a high desire for control and an experience of a low feeling of control during treatment, scored significantly higher on a dental fear scale than patients who had a high desire for control and an experience of high control. They also scored higher than patients with a low desire for control. A desire for control is thought to be dependent on a person's previous experience and his/her personality. The degree of perceived control during treatment is dependent on both the patients' individual needs and the dental setting (e.g. practical arrangements for stopping the treatment, predictability and the dentist's mode of treatment). Milgrom, Weinstein and Getz (1995) hypothesized that limited experience of control in the dental treatment situation is a predictor of dental anxiety. A study from Australia confirms that uncontrollability and dangerousness had a strong relationship with high dental fear prevalence (Armfield, Slade and Spencer 2008).

Regression

Some dental fear patients describe a desire to scream, to cry, or to run out of the office. They experience these urges as stupid, childish and unlike their regular behaviour and this is frightening. These reactions may be explained, at least partly, as regression phenomena. Regression is a state where the person reacts in an immature way, often linked to the stage where a traumatic event happened (Gill 1972). In a dental setting this means that the adult patient may react emotionally in an infantile way, possibly linked to actual stressful or traumatic experiences in the past. The patient may also have an exaggerated recall of the size of things, for example the size of the injection syringe or the dentist's hands (Todes 1972).

Christina, 26 years old, reported:

When I sit in the dental chair I feel like I am about five years old and helplessly abandoned. And I recognize these feelings. I was hospitalized for long periods at that age. When my parents were with me, I was happy. They always left me while I was occupied with playing and I did not really observe that they left. When I realized that they were gone, I had these helpless and abandoned feelings and it was extremely frightening.

Niles, 35 years old, claimed:

The dentist told me that my teeth were very bad and that my mother had given me sweets and not taken care of my teeth. I felt this as a strong accusation towards my mother. After this event, I always

felt defensive in dental clinics. As soon as I was old enough, I withdrew from contact with dentists and I never told my mother the reason. Even if I intellectually know that the accusation was not true, I still feel a strong distrust against dentists.

Personality

Considering different aspects of dental treatment, basic trust between patient and dentist seems to be essential. The patient must trust the dentist to provide him/her with the dental service he/she needs. In all dental clinics difficulties can arise if the dentist's personality is incompatible with the patient's and this can lead to problems in trust between them. Thus, it is likely that such incompatible personalities between dentist and patient may contribute to the increasing feeling of stress in both dentist and patient. To prevent this, it is important for the dentist not to regard personality differences as a defeat but to recommend a change of dentist. There are patients whose personality or previous experiences are such that the normal development of trust and confidence in other human beings is interfered with (Miller 1970).

Patients with dental anxiety often report negative experiences with a specific dentist during childhood and they blame this dentist for their dental anxiety. Nevertheless, there must be many patients who have been treated by the same dentist without developing dental anxiety. It may be that persons with specific personality traits experience negative stimuli as more threatening and therefore have an enhanced risk of developing dental fear.

In a number of studies factors related to personality have been shown to predispose for dental anxiety, for instance: impulsivity in temperament (Stenebrand, Boman and Hakeberg 2012); alexitymia (Pohjola et al. 2011a); general anxiety and depressive disorder (Pohjola et al. 2011b); and neuroticism (Vassend, Røysamb and Nielsen 2011).

Elements of the Fear Reaction

When exposed to a dangerous situation, humans will experience an emergency reaction of the body including different elements of fear: cognitive, physical, emotional and behavioural. These elements will now be described.

The cognitive element

This element includes expectations of specific impending harm. When the cognitive element triggers a fear reaction people will automatically exaggerate the actual danger, but subsequent cognitive assessment will usually produce the correct and suitable reaction to the danger in a specific situation. The context in which it occurs is important for the cognitive assessment. A lion's roar will alert us if we are on an African safari. If the lion is behind bars at a zoo in our home town, the reaction will be different.

Lazarus (1966) broke down the individual construction of a potentially dangerous situation into a series of steps: primary appraisal, secondary appraisal and reappraisal. He described cognitive processing as analogous to the process of taking a photograph. Specific settings like type of lens, focus and so on, have an enormous effect on the information in the photograph. In the same manner through selective attention our expectations, interests and concerns will affect the perception of the event (Rosenhan and Seligman 1989). We conceptualize a situation

in terms of how it may affect or threaten us. This is illustrated when eye witnesses are asked to describe a specific situation. The eye witnesses 'see' different situations even if they observed the same event and it may be impossible to reconstruct the 'true' event.

This 'first shot' of information observed by the threatened subject is called the primary appraisal. Potentially dangerous situations are often treated as a threat in the primary appraisal. Normally a reappraisal will occur and the threat may be defined as false. A person who is very anxious or afraid will not be able to make these reappraisals and will therefore treat all 'false' threats as being dangerous. This may explain the clinical observation that patients with dental anxiety often seem to be unable to distinguish between unpleasantness and pain during dental treatment. In a cognitive approach these thoughts arising in the primary appraisal are essential.

Physiological elements

Fear reactions lead to many bodily changes, both internally and externally. In a matter of seconds after a perceived danger, our body's resources are mobilized involuntarily (Rosenhan and Seligman 1989). The external changes are prominent in many animals; the octopus changes from green to red when it is afraid. Human appearance may also change. Physiological reactions can often lead to altered body language and different facial expressions (Lanzetta and Orr 1980).

The purpose of the internal changes is to enable us to deal with the dangerous situation observed or perceived. Fear and stress cause an increase in muscular tension and activate the autonomic nervous system. All forms of behavioural therapy based on relaxation aim to subdue this muscle activation.

Emotional elements

These are the elements we describe when we talk about our feelings of fear such as feelings of dread, terror, panic or just a creeping sensation or tight stomach. We are generally most conscious of the emotional elements, whereas the cognitive and physiological emergency reactions are usually outside of awareness and therefore less readily observed.

Behavioural elements

How the fearful person behaves, decides the consequences of the fear reaction. Thus, in order to act empathically with patients suffering from dental fear it is important to understand such reactions.

When the individual, through the elements of the fear reaction, appraises the situation as fear provoking, he/she will react voluntarily to do something about the object or situation that provokes the fear. Research distinguishes between four major behavioural strategies:

1. *Withdrawal*. It is likely that he/she will run away from the frightening situation if given the chance. This is called an escape response. By using avoidance behaviour we try to avoid the threatening situation, e.g. using the stairs instead of the elevator (Rosenhan and Seligman 1989). Milgrom, Weinstein and Getz (1995) described withdrawal reactions in patients with dental fear. They referred to two gradients that are decisive for the response: the avoidance gradient and the approach gradient. One response is characterized as total

avoidance, the patient will not seek dental treatment (the avoidance gradient is always stronger than the approach gradient). Another response is partial avoidance, which means that the patient occasionally manages to attend dental appointments but on other occasions cancels appointments (his/her avoidance gradient has become stronger than the approach gradient when the consultation is to take place).

2. *Aggressive defences.* In all animals and humans as well, fighting is a conceivable way of coping with threatening situations. If we cannot avoid or escape the situation, we will eventually have to fight. If an animal is frightened and not able to escape from the situation, it attacks and all available means are used. Many physiological responses to fear are similar to the responses to anger. These include among others, raised blood pressure and increased blood flow through the muscles, rapid breathing and hair standing on end. Milgrom, Weinstein and Getz (1995) described a patient with this reaction as a 'goer but hater' which means that both the avoidance tendency and the stress activation are high. The patient shows up at the dentist's office with clearly hostile reactions and a situation may easily develop where the patient appears to be unreasonably aggressive.

Monica, a 15-year-old girl, always enters the dental office with the statement 'I hate dentists'.

3. *Immobility.* Attentive immobility or freezing can be a proper way of dealing with a threatening situation. It means that the person or animal stops, localizes the danger and prepares to deal with it. This may last for seconds or hours. This reaction can be more effective than trying to escape and is often alternated with aggressive defence. For instance, the deer hides its calves in tall grass. If a hunting fox gets close, the calf freezes and the fox may not detect it. Clinical observations show that patients with dental anxiety/ phobia may have similar responses of immobility. In order to cope with dental treatment, they freeze their reactions and mobilize all their energy, in an effort to get the treatment over with. In many cases this is a useful technique and to the dentist it may look as if the patient is in control of the situation. However, there is reason to believe that the patient experiences the situation as unpleasant and this reaction may act as a reinforcement of the anxiety. Immobility can also be tonic. This means that the person or animal is totally paralyzed in a dangerous situation. Survivors of attacks by wild animals and more than 50 per cent of child sexual abuse victims report this state (Heidt, Marx and Forsyth 2005).

Anne is a 38-year-old woman who sought treatment at a dental fear clinic. She had been to the dentist regularly but she had never told her dentist about her dental fear. She said that she felt completely paralyzed and helpless in the dental chair and she just wanted it 'over with'. After the treatment she felt as she had been paralyzed during treatment and felt exhausted. During dental fear treatment she could connect her feelings of helplessness to a traumatic experience when she had been raped at the age of 17. Lying in the dental chair made her feel helpless in a way that reminded her of the rape.

4. *Deflection of attacks.* To handle a threatening situation, animals as well as humans are capable of diverting the attack away from the source. When a dog threatens a bird's eggs, the bird may move quietly away and distract the dog's attention from the nest (Simmons 1952). Comparable reactions make persons with dental anxiety assert that dental treatment is too expensive, that the dental clinic is too far from home and so on.

Richard, 45 years old, says to his friends: 'I have not been to the dentist for a while and I won't go now either. Dentists are overpaid and I prefer to use my savings on a trip to Paris with my wife'.

Aetiological Theories of Dental Fear and Anxiety

The aetiology of phobic disorders has its origins in a hard-wired, species-typical fear response (Barkow, Cosmides and Tooby 1992; Öhman and Mineka 2000). The explanation for the development of phobic disorders must therefore be analysed with this biological mechanism in mind. What we fear is not a coincidence: we primarily fear situations and objects which have represented a threat to survival throughout the evolution of the phyla. Some situations and objects, therefore, seem to be highly prepared for learning. This highlights the importance of quickly detecting danger with minimal sensory input and readily learning which stimuli represent danger and generalizing this association easily. Thus, the equipotentiality hypothesis posited by Pavlov (1929) has been replaced by the preparedness hypothesis formulated by Seligman (1971).

Behavioural/learning approaches

The behavioural/learning approaches have dominated the empirical perspective on anxiety disorders from the 1920s until the early 1970s (Mineka and Zinbarg 2006). The traditional classical conditioning paradigm was first described by Ivan Pavlov (1927, 1929) and is schematically illustrated in Figure 4.1.

It later became apparent that the traditional conditioning theory could not give the complete picture of human fear acquisition. Rachman (1976, 1977, 1978) proposed a three-pathway theory of phobia acquisition postulating that phobias are acquired either by: direct conditioning, modelling or instructions/information. It is to be noted that direct conditioning is more frequently reported than vicarious conditioning or via information and that a significant proportion do not endorse any of these pathways (Barlow 2002). Thus, contemporary associative accounts include previous learning histories which serve as vulnerability factors, temperamental vulnerabilities and contextual factors during and following traumatic learning events (Mineka and Zinbarg 2006).

Preparedness

Preparedness implies genetic transmission. It implies that *what* we fear and *how* we fear is innate (Barlow 2002). Both genetic and environmental factors have been found important in the genesis of specific phobias. The hereditary component seems to involve a specific genetic

Before conditioning:	Unconditioned Stimulus: Pain (US): → Unconditioned fear response (UR)
	E.g. Syringe, drill (Neutral stimulus) (NS) → no response
Conditioning:	E.g. syringe, drill (NS) → Pain (US) → UR
After conditioning:	E.g. syringe, drill (Conditioned stimulus, CS) → Conditioned fear response (CR)

Figure 4.1 Principles of classical conditioning as applied to the dental treatment setting. Fear is conditioned in an individual when a neutral stimulus like a syringe or drill is associated with aversive stimuli such as pain or aversive sounds of a dental drill

contribution: What is inherited seems to be specific defensive responses (e.g. vasovagal responses or low threshold for alarm reactions) which interact with non-shared environmental influences (e.g. traumatic incidents in potentially phobic situations) (Barlow 2002; Kendler et al. 1992; Page and Martin 1998).

Genetic and conditioning framework

How can dental phobia be understood in both a genetic and conditioning framework? The stimuli inherent in dental treatment do not in themselves represent stimuli that have posed a threat in the evolutionary history. But the treatment situation contains three possible prepared factors: sharp object causing pain, constraint and lack of control over aversive stimuli (pain) (e.g. Bracha, 2004, 2005, 2006). It may be claimed, therefore, that the dental treatment situation especially, becomes vulnerable to classical conditioning as pain is a true alarm. In terms of dental phobia, several studies support the classical conditioning theory as phobic patients frequently report negative experiences during dental treatment (De Jongh et al. 1995; Hugdahl and Öst 1985; Lautch 1971; Locker, Shapiro, and Lidell 1996; Moore, Brødsgaard and Birn 1991; Öst 1987; ter Horst and De Wit 1993). Conditioning, however, does not occur in isolation. It occurs in the context of the individual's biological environment. Whether something is experienced as traumatic or not, depends upon the individual's interpretation. Thus, whether or not a dental treatment becomes a conditioning event is connected to the extent to which that person experiences it as such. This again is connected to aforementioned factors: genetic components, as well as contextual factors such as control and escapability (Mineka, Cook, and Miller 1984; Mineka and Zinbarg 2006).

Thus, there is an increasing consensus that emotional learning is a distinct process, to which the principles of conditioning are especially applicable (Bouton, Mineka, and Barlow 2001). This becomes highly relevant for the dental treatment situations as one risks encountering pain, lack of control over aversive sensations (pain, sound of drill) and inhibited escapability.

The Multi-factorial Aetiology of Dental Phobia

Thus, dental phobia, as other anxiety disorders, is a phenomenon of multi-factorial and complex origins. In a clinical setting, the development of dental anxiety may be presented in the following model, highlighting the interaction between three factors, namely: personal factors, external/social factors and dental factors (Figure 4.2). The interaction between genetics and conditioning is not explicitly distinguished in this model, but instead assumed inherent in each of the factors.

Personal factors

As dental fear and anxiety often has its origin in childhood, the personal factors in the model reflect that many children, and especially small children, show fear and behaviour management problems during dental treatment. However, as dealt with in Chapter 2, most of these fear reactions should be regarded as within the normal emotional range of reactions to new and threatening situations and in clinical dentistry they should not be considered as symptoms of an anxiety disorder. All children are going through different phases of socio-emotional

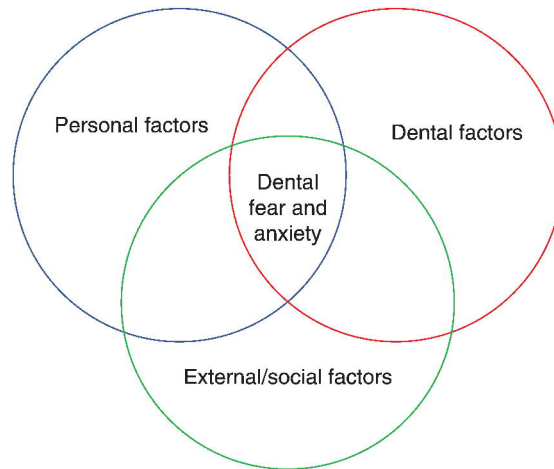


Figure 4.2 A model for development of dental fear and anxiety

development, some of them characterized by obstinacy and insecurity and when these ‘crises’ coincide with dental treatment they may result in fear and behaviour management problems. As the children grow older and become more mature, most of them are able to better understand the situation, be motivated for treatment and able to comply with dental procedures.

Besides differences in age and maturity, there are a number of factors that may affect the individual vulnerability to become dentally anxious and phobic. Examples of such factors are certain personality traits and temperament, other mental or developmental disorders and possibly also genetic factors (Klingberg and Broberg 2007; Ray et al. 2010).

Temperament is a personal emotional quality that is moderately stable over time. It is believed to be under some genetic influence. Dimensions of temperament that have been associated with dental fear and/or behaviour management problems in children are ‘shyness’, ‘negative emotionality’, ‘activity’ and ‘impulsivity’ (Stenebrand et al. 2012). Among children referred to a specialist clinic due to behaviour management problems, subgroups of temperament profiles have been identified (Arnrup et al. 2007). Some of these subgroups are children displaying high general and dental fear (‘shyness’, ‘negative emotionality’, ‘internalizing behaviour’), whereas others display behavioural problems with less fear (‘impulsiveness’ and ‘externalizing behaviour’). A similar relationship between dental anxiety and temperament has also been found among adults (Bergdahl and Bergdahl 2003; Lundgren et al. 2007).

Uncooperative behaviour and dental fear/anxiety have also been related to neuropsychiatric disorders in children and adolescents, e.g. attention deficit hyperactivity disorder (ADHD), autism, Asperger syndrome, Tourette’s syndrome and other mental disorders (Klingberg and Broberg 2007). Some patients are generally fearful for other reasons, e.g. they have a history of traumatic events with lack of control in the situation. This may increase their vulnerability to fear stimuli in the dental situation and acts as a contributing factor in an ongoing process towards a dental anxiety disorder.

Survivors of torture (Singh et al. 2008) and sexual abuse (Humphris and King 2011; Willumsen 2004) have also been shown particularly vulnerable to the development of dental anxiety.

External/social factors

It is well known, based on research (Freeman 2007; Hittner and Hemmo 2009) as well as clinical experience, that parental dental anxiety affects fear and anxiety in children. Children may also acquire dental fear through social learning from their siblings or from their friends in kindergarten and school.

It is a common experience among paediatric dentists that when children are accompanied by anxious parents (usually mothers) to their dental appointment, the child senses the parent's apprehension, even non-verbally. This, which probably also has taken place in advance of the appointment, may increase the child's general vulnerability to unfamiliar and unpleasant procedures and thereby increases the fear. It should be realized that this factor should be counteracted by the behaviour of an observant dentist in order to prevent the fear from developing into an anxiety disorder. A similar situation may exist in cases where the child is present during a parent's dental visit and the child is exposed to the parent's possible anxiety reactions before, during and after treatment (modelling).

A patient's social situation may also be of importance. Dental anxiety problems have been reported more frequently in groups with lower socioeconomic status and among immigrants (Gustafsson et al. 2007). A reasonable explanation is that subjects in these subgroups are more vulnerable to fearful dental stimuli as additional to other daily problems. It is also a fact that the oral health in these groups is inferior to the general population, thereby increasing the risks of experiencing unpleasant and painful procedures during dental treatment. This is also known to affect their attitudes and behaviour.

Dental factors

There is strong evidence that previous painful dental procedures are the most important aetiological factor for dental anxiety disorders (Berggren and Meynert 1984; Milgrom, Mancl et al. 1995; Locker et al. 1996). Most patients, both children and adults, mention *painful dental treatments* as the cause of their dental fear/anxiety/phobia and in particular when pain has been experienced in combination with a feeling of *lack of control* (Milgrom, Vignehsa et al. 1992). Based on the fact that the acquisition of dental anxiety and phobia in most cases (Öst and Hugdahl 1985) seems to follow the theory of learning by classical conditioning, these factors are regarded as the most important unconditioned factors.

Pain is defined by the International Association for the Study of Pain (2011) as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. The sensation of pain is not necessarily dependent upon tissue damage; it may also be generated by conditioned stimuli such as the sound and vibration of the drill, the smell, the touch of the explorer and other instruments. Since painful stimuli normally bring about physiological and psychological reactions to protect the body from tissue damage, fear reactions and uncooperative behaviour are logical and relevant reactions when a patient experiences pain or discomfort.

In a model of the aetiology of fear (Armfield 2006), perceptions of stimuli as uncontrollable or unpredictable contribute to create cognitive schema of vulnerability. The fact that dental treatment with elements of uncontrollable pain and unpredictability increases dental fear, supports this model of aetiology of fear.

These are typical reactions in children. Their understanding of (and vulnerability to) pain varies considerably depending on cognitive abilities and the reactions and thoughts concerning painful stimuli vary according to age and maturity (see above). There is also a growing body of evidence showing that children, who have been subjected to painful procedures without adequate anaesthesia, develop increased perception of pain during future procedures, despite adequate pain control (Fitzgerald and Howard 2003). In a vulnerable child patient one strong painful dental stimulus may be enough to cause dental fear and start a vicious circle resulting in anxiety and phobia. Repeated exposures to discomforting or painful dental treatments, or procedures perceived as such by the child, will increase the likelihood for a vicious development.

Discomfort goes hand in hand with pain and anxious patients frequently have problems distinguishing between the two. Discomfort can represent a psychological comprehension of a stressful situation. This is often experienced in novel situations, if the patient is frightened about what will happen, or experiences lack of control, and so on.

Perceived lack of control may imply that the patients have not been properly informed about the treatment (informational control), or that they have been deprived the influence of their own behaviour (behavioural control), or even that they are not given sufficient information after the treatment (retrospective control). These situations typically occur when dentists are more occupied by accomplishing the dental treatment than taking care of the patient as a whole, being in a hurry and not communicating well with the patient. The confidence between the patient and the dentist is reduced, resulting in an increased vulnerability for pain and discomfort. Painful dental treatment in situations when the patient feels lack of control is therefore particularly harmful.

Many patients, particularly children, are anxious of having dental injections and they tend to avoid local analgesia during dental procedures. An overlap between BII phobia and dental phobia has been shown (Poulton et al. 1998; Vika et al. 2008) and the average onset of BII phobia seems to be earlier than dental phobia (Öst 1987). A possible interpretation of these relationships is that some children with symptoms of BII phobia have increased risk of developing dental phobia and one reason may be that avoidance of dental analgesia injections has resulted in painful dental procedures.

From Dental Fear to Dental Phobia – Three Vicious Circles

The development of dental phobia may be described theoretically by three vicious circles. The internal vicious circle of dental fear is adapted from the vicious circle of panic disorder by Clark (1986). The model is illustrated in Figure 4.3 and describes internal reactions as perceived during exposure to possible danger. The patient experiences the dental treatment situation or the thought of this situation as threatening. He/she will respond to this with increased muscular tension and a set of bodily changes induced by the autonomic nervous system (e.g. increased blood pressure, sweating and increased heart rate). The patients tend to misinterpret these bodily sensations as signs of imminent physical and mental disaster. This results in thoughts with catastrophic content, which in turn increase the feelings of threat, dread and terror. In this way the patients experience feelings of panic, which are beyond their control.

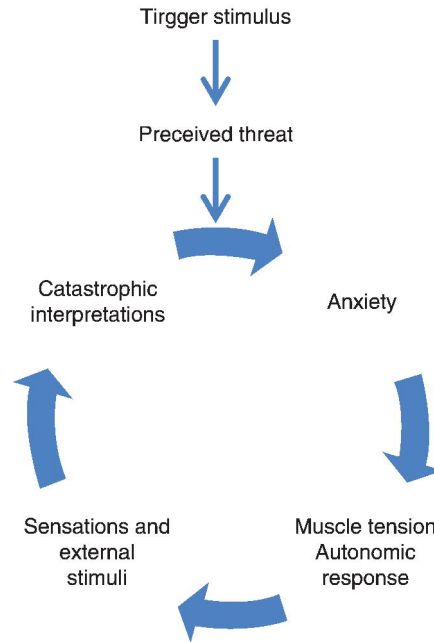


Figure 4.3 The internal vicious circle of dental fear. Modified from Clark 1986

Linda, 35 years old, successfully treated in a dental fear clinic reports: ‘When in the dental chair, I had no control of my body and catastrophic thoughts. The fear and panic reaction seemed to develop without my control. After treatment I can recognize the reactions in my body and control them’.

A second model, illustrated in Figure 4.4, illustrates avoidance behaviour and its consequences. This circle is called the vicious circle of interpersonal relations. This model focuses upon the consequences of postponing appointments and of not attending sessions. It is a well-known phenomenon that people with dental fear often cancel or postpone appointments. For the dental staff this causes practical, emotional, financial and motivational problems. Even if all members of the dental staff are trained and professional in their treatment of patients, they will most probably sometimes experience negative emotions in cases where patients do not show up.

At 3 p.m. a sunny Friday afternoon all staff in the dental clinic look forward to start of the weekend at 3.30 p.m. The receptionist answers the telephone. It is Roger, a 35-year-old man who has a history of seeing dental care only in emergency cases. This afternoon he is in horrible pain and his cheek is swollen. Last time he visited the clinic one year ago the dentist had advised him to treat deep caries in an upper molar, but he had not showed up for the appointment. He says he is anxious and he wants a consultation before the weekend. Because you know that the patient is anxious you agree to see him and the receptionist answers: ‘OK, We can have a look at you after our last regular appointment, can you be here within 30 minutes?’ He assures you that this is no problem. At 3.30 you are finished, but no Roger is in the waiting area. At 3.45 he rushes into the office ...

When the patient actually shows up, the emotions of the dental staff and of the patient make the dental treatment situation difficult. The dental staff, even if they try to ignore it, get annoyed and the patient has a high stress level. The emergency consultation has the potential

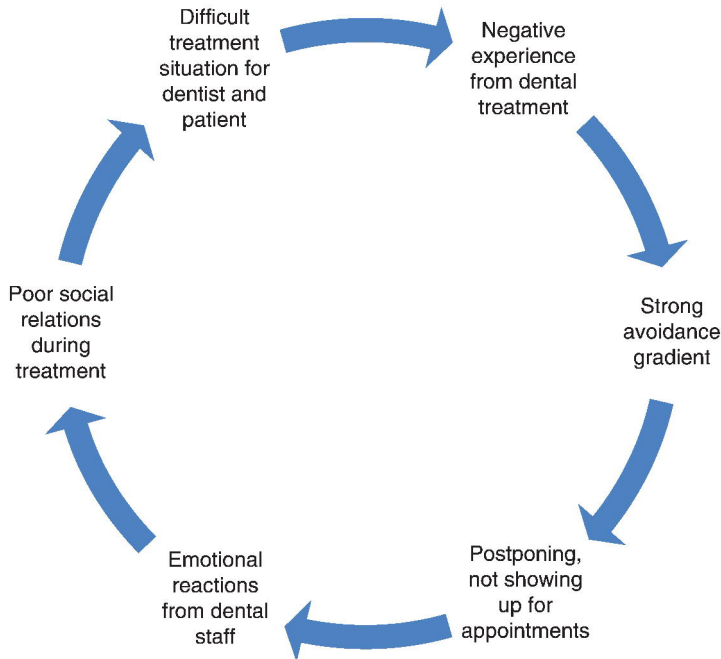


Figure 4.4 The vicious circle of interpersonal relations. Willumsen 1999

to be experienced as difficult for both the dentist and the patient. If so, the difficult treatment situation is likely to be remembered as a negative experience by the patient. Thus, the possibility for cancellation of the next appointment and the chances of avoiding all dental treatment increases.

After the appointment Roger tells his friends: 'Yes, I finally went to the dentist for an emergency treatment, but as expected the treatment was painful. In addition the dentist seemed stressed and I felt that I was a burden. And it cost a fortune. I really don't like dentists. I am glad the tooth was pulled out so my dental problem is solved and I don't have to see the dentist again for a long, long time'.

Berggren and Meynert (1984) have described a third vicious circle. It is called the general vicious circle of dental phobia and is illustrated in Figure 4.5. When a patient with dental fear starts to avoid dental treatment, this leads to a deterioration of the dentition. Bad teeth create negative feelings such as shame, guilt and embarrassment with respect to dental treatment as well as in ordinary social situations. These feelings are in turn likely to reinforce avoidance behaviour and the vicious circle is thus established.

General Conclusions

The aetiology of dental phobia is multi-factorial and several models have been outlined in this chapter. Psychological disorders are in general viewed within a bio-psycho-social framework in which the interaction between genetics and environmental learning are assumed. Furthermore, in terms of dental phobia from a clinical perspective, one may underline three contributing

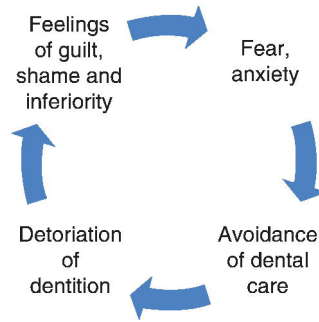


Figure 4.5 The general vicious circle of dental phobia. Berggren 1984

factors: *personal factors*, *external/social factors* and *dental factors*. The *personal factors* are individual variations that make a patient more or less vulnerable for the disorder, such as age and maturity, sex, personality traits and temperament. *External/social factors* are based on a learning approach from the social environment or a social situation that makes the patient generally more vulnerable. The most important is probably the *dental factors* since a majority of dentally phobic patients report previous painful and unpleasant dental treatment as the origin of their phobia. In most cases the phobia has its origin in childhood and adolescence and it develops over time in a vicious circle of avoidance, poor oral health and feelings of shame and guilt.

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Intra-Oral Injection Phobia

Margrethe Vika and Maren Lillehaug Agdal

Blood-Injury-Injection Phobia

Blood-injury-injection (BII) phobia is one of five different types of simple phobias classified in the DSM-IV (American Psychiatric Association 1994). BII phobia may be considered as one of the most serious phobias since the avoidance of stimuli associated with it may lead to avoidance/denial of necessary dental and medical treatment (Marks 1988; Vika et al. 2008). BII phobia is characterized by extreme and excessive anxiety in connection with one or more of the following situations: seeing blood or injury to oneself or others; watching another person get an injection; receiving injections (intra-oral and/or extra-oral); and/or exposure to other invasive medical/surgical procedures.

The fear reaction associated with BII phobia and the subtype, intra-oral injection phobia, may be triggered by several stimuli related to the syringe and/or the needle: seeing the syringe/needle; experiencing the needle penetrate the gums; the feeling of being anaesthetized; the sensation of swelling gums; fear of not being adequately anaesthetized; fear of tissue damage; and fear of allergic reactions related to the injection fluid (Öst et al. Unpublished; Raadal et al. 2010). Furthermore, for specific phobias in general, most of the phobics report catastrophic thoughts regarding the consequences of facing the feared stimuli. This is also true for intra-oral injection phobics (see Catastrophic Beliefs in BII Phobics below).

Prevalence, Subtypes and Gender Differences

The lifetime prevalence of BII phobia is reported to be about 3.1–4.5 per cent of the adult population (Agras, Sylvester and Oliveau 1969; Bienvenu and Eaton 1998; Curtis et al. 1998; Depla et al. 2008; Stinson et al. 2007). These subgroups are fear of physical injuries 0.8 per cent; blood 0.8–1.0 per cent; and injections 1.1–1.6 per cent (Fredrikson et al. 1996). Injection

phobia can be divided into two separate subgroups, namely phobia of *extra*-oral injections (on the skin) and phobia of *intra*-oral injections (in the mouth). The exact prevalence and degree of overlap is not well established, since most of the studies do not differentiate between the two subgroups. Differences in both diagnostic criteria and measurement methods may also cause inconsistent prevalence figures in the literature. In a sample of 1385 adolescents, 18 years of age, Vika et al. (2006) found that of the 17 per cent that reported fear of injections, 8.1 per cent were highly fearful of both intra- and extra-oral injections, whereas 7.7 per cent and 8.4 per cent reported high fear of extra-oral injections and intra-oral injections, respectively.

In general women report simple phobias more often (2:1) than men, whereas gender ratio in BII phobia varies in different studies (Fredrikson et al. 1996; Oosterink, de Jongh and Hoogstraten 2009). Two studies by Bienvenue and Eaton (1998) and Beesdo, Knappe and Pine (2009) found higher prevalence of BII phobia in females (female: 4.4–6.4 per cent; male: 1.8–3.9 per cent) whereas Fredrikson et al. (1996) found no gender differences. However, regarding the *subtype* injection phobia Fredrikson et al. found that 1.9 per cent of the women and 1.2 per cent of the men reported this phobia.

Catastrophic Beliefs in BII Phobics

In general, a common model for explaining the aetiology of anxiety disorders claims that it is the individual's judgements and beliefs about possible threats in relation to the feared situations or stimuli that maintain the anxiety. Most research in this area has been in relation to panic disorder. Patients with panic disorder may interpret the normal fear reactions (e.g. increasing heart rate and respiratory frequency) as signs of serious somatic illness (Latas, Obradovic and Pantic 2009). In the literature these assumptions and interpretations are often referred to as catastrophic thoughts. The catastrophic thoughts may appear differently across the various anxiety disorders. Usually, patients carry out safety behaviours in order to prevent catastrophic beliefs from occurring (Salkovskis, Clark and Gelder 1996).

Öst et al. (unpublished data) investigated the prevalence and quality of catastrophic beliefs in a sample of patients with intra-oral injection phobia. Based on information from a diagnostic interview, the catastrophic beliefs were classified into the following categories: 'physical', 'mental' and 'social'. Sixty-seven percent of the patients were classified with a physical catastrophic thought. The most frequent thoughts were fear of bodily harm/injury and fear of dying, with frequencies of 24 per cent and 18 per cent, respectively. The most frequent mental fears were reported to be fear of going insane and losing control (with and without 'acting out'). Only 5 per cent of the phobics reported fears in relation to the social category.

Aetiology

For most specific phobias the onset of BII phobia is during childhood. The median age of onset is 5.5 years and the mean age of onset is about 9.4 years (Bienvenu and Eaton 1998; Lipsitz et al. 2002). In a study by Öst (1987) the age for the onset of blood and dental phobia was 8.8 and 11.7 years, respectively.

BII phobia is a specific phobia with the highest reported family prevalence. Up to 60 per cent reported that they had parents or siblings with fear or phobia of BII stimuli (Öst 1992). The reason for the high figure may also be closely related to the emotional sensitivity in BII phobia.

There are associative and non-associative means of becoming BII phobic (Coelho et al. 2010). Perception of a painful dental injection is an example of a common classical conditioning to dental injections. The sufferers may have catastrophic thoughts and/or other dysfunctional thoughts in relation to the feared situation. An elevated certainty that the events they feared 'really' would occur, shared with low expectancies for dealing with the phobic situations or events if they occurred, may decrease the sense of control (Logan et al. 1991). Previous studies have shown that experiences of pain increase the risk of the patient developing dental anxiety. Additionally, pain combined with lack of control multiply to a large degree the risk of the patient developing dental anxiety (Law, Logan and Baron 1994; Logan et al. 1991; Milgrom, Vignehsa and Weinstein 1992). It seems reasonable to believe that experiences of pain and lack of control will have a similar relationship in connection with fear of intra-oral injections.

Vicarious conditioning, modelling, visual observation of fear and negative information/instruction transmission may cause some to become phobic of BII stimuli (Öst 1992), without themselves having a direct negative experience. Usually children observe how their parents or siblings relate to their surroundings. Children's observations of parents or siblings reacting with high anxiety to BII stimuli are also a risk factor for developing high BII anxiety. It is important that medical staff are aware of these conditional factors when providing medical care. In addition, one must realize that these learning processes may influence the children in a positive manner when the 'model' is performing a positive behaviour in the dental situation.

Most of us remember vicious rumours about medical injections. When the majority felt a bit frightened, the rumours kept others from having the injections, or they had them despite significant clinical distress. But why is it that some individuals become phobic and others remain without anxiety after a negative experience?

Furthermore, why will some become anxious after an episode of vasovagal syncope, while others seem unaffected? This may be explained by non-associative means which include psychological preparedness (Seligman 1971) or vulnerability (Beck, Emery and Greenberg 1985, Marks 1988) and a high level of general fearfulness (Öst 1987). Vulnerable patients are more cautious of the situation being dangerous, uncontrollable, unpredictable and disgusting (Armfield 2010). Some individuals are assumed to have lower thresholds for activations of the 'fight-or-flight' response and they may also have excessive and prolonged responses in relation to 'false alarms' (Barlow 1988). This may be partly explained due to innate vulnerability. Also, strong feelings of disgust and repulsion may be the cause of high anxiety in vulnerable persons. The fear, anxiety and avoidance associated with the specific object or situation are, however, not restricted to the symptoms of disorder (LeBeau et al. 2010). It seems likely that separating emotions from cognitions is highly problematic because of the interconnectedness and parallel processing in the brain (Gray, Braver and Raichle 2002).

Mowrer's (1960) two-factor theory of avoidance is highly influential in the maintenance of anxiety. Fears develop initially via classical conditioning and then are maintained via operant conditioning with negative reinforcement (avoidance). The avoiding nature of the phobia increases the anxiety level and may also keep the patient from seeking help to overcome the anxiety.

Fainting response

Unique for BII phobia is the relatively large tendency to faint (Bienvenu and Eaton 1998; Hallam, Connolly and Marks 1976; Kleinknecht and Lenz 1989; Öst 1992) as compared to other specific phobias. Estimates of the frequency of fainting in the presence of blood, injury and injections are inconsistent and vary between 5–80 per cent or more (American Psychiatric Association 1994; Kleinknecht, Thorndike and Walls 1996; Page 1994). Consistent with the frequency of fainting in the adult population, Vika et al. (2006) found that 7.4 per cent of Norwegian adolescents had fainted during medical injections. In the dental situation the frequency of fainting was lower, while 15.9 per cent reported that they had nearly fainted during dental injections, only 1.7 per cent had actually fainted.

Engel and Romano (1947) described the fainting process as a biphasic response to the BII stimuli (see also Graham, Kabler and Lunsford 1961). Typically, when patients are exposed to BII stimuli they will first experience increased heart rate and blood pressure, which are typical physiological reactions in the anxiety response. Shortly after the sympathetic flow, there is a cardiovascular deceleration, meaning a marked drop in blood pressure and/or in heart rate (Connolly and Wieselberg 1976; Öst, Sterner and Lindahl 1984; Thyer and Curtis 1985). This deceleration is due to activation of the parasympathetic nervous system (Levenson 1992). The patient becomes pale and sweats and may experience a vasovagal syncope.

It has been discussed whether some of the individuals who faint in relation to BII stimuli may have a common genetic disposition or an underlying circulatory dysregulation that predisposes them to vasovagal syncope. This atypical fainting response pattern may be assumed as an appropriate response in situations where injury may cause major blood loss. One may claim that individuals who faint and thereby have decreased blood pressure may suffer from less blood loss. Furthermore, fainting may be consistent with the 'playing dead' mechanism as observed in many animal species in relation to specific fears (Accurso et al. 2001). The animal may then be less likely to be attacked by predators.

Disgust and disgust sensitivity in BII phobics

BII phobia differs significantly from most other specific phobias in that BII phobics may report disgust in relation to the phobic stimuli. Clinical and experimental evidence suggest that exposure to BII stimuli evokes reactions of aversion and nausea (Gross and Levenson 1993; Rachman 1990). Disgust has been identified as a basic emotion (Ekman 1992) and is characterized by well-defined and reliable physiological (e.g. nausea), expressive (e.g. facial), behavioural (rejection) and interpretive (e.g. contamination) response components (Rozin, Haidt and McCauley 1993). In contrast with the acute sympathetic nervous system reaction (e.g. cardiovascular acceleration) associated with the fear response to phobic stimuli (Ekman, Levenson and Friesen 1983; Gelder and Mathews 1968), the physiological mechanism of disgust reflects *parasympathetic activity* (nausea, dizziness and fainting) (Ekman et al. 1983). The disgust sensitivity is found to be positively associated with fainting in BII phobics and especially for the subtype blood phobia (Hepburn and Page 1999).

In contact with blood, injection or injury stimuli the disgust-mediated aversion may serve both preventative (i.e. escape and avoidance with the goal of evading physical contact and contamination) (Rachman 1990; Sawchuk et al. 2002) and reactive (i.e. purging and vomiting following contact or ingestion) functions. One of the theoretical models discussing the

relationship between cognitions and emotions claims that emotional responses appear before cognitions and that acquisition of BII phobia is known to be followed by sensitivity to emotions and physiological reactions. Unlike other specific phobias, the emotional response for some BII phobic patients is the strong feeling of disgust and repulsion and not threat-induced fear (Page 1994; Sawchuk et al. 2002; Tolin et al. 1997). Research is, however, unambiguous as to whether patients who are prone to feel disgust in relation to BII stimuli are more sensitive to becoming BII phobic (De Jong and Peters 2007; Kleinknecht, Kleinknecht and Thorndike 1997; Matchett and Davey 1991; Merckelbach et al. 1999). Page (2003) suggested that the sense of disgust is highly related with fainting. The emotional response to the sense of disgust may accelerate both the anxiety and the fainting response due to previous conditioning experiences.

Regardless of the increased interest in the relationship between fainting in BII phobia and disgust, the literature remains equivocal, where some argue that the relationship between them is entirely explained by the covariation between fear and disgust, rather than disgust being a direct predictor for fainting (Kleinknecht et al. 1997; Olatunji et al. 2006; Schienle et al. 2003). Another problem with investigating the role of disgust in relation to BII phobia may be that the term disgust is not consistently defined in the different studies. In some studies the term disgust is related to nausea and dizziness (and fainting), which is a normal anxiety reaction. In other studies disgust appears as a concept describing the perception of being contaminated and infected.

Overlap between BII Phobia and High Dental Anxiety

According to DSM-IV (American Psychiatric Association 1994), dental phobia is classified as a subtype of BII phobia. Most studies report a considerable but varying, estimate of overlap between BII anxiety and dental anxiety. These variations may be explained due to differences in diagnostic criteria, levels of anxiety, different subtypes and so on. Among patients with high dental anxiety 16–56.7 per cent (De Jongh et al. 1998; Locker, Shapiro and Liddell 1997) are classified as BII phobic. On the other hand 8.2–56.7 per cent of patients with BII phobia have high dental anxiety (De Jongh et al. 1998; Öst 1992). Dental phobic patients often consider dental injections as extremely anxiety provoking. In a study from the Netherlands 39 per cent of patients with high dental anxiety reported fear of having a dental injection (De Jongh et al. 1998). A community study from Norway found that fear of dental injections is prevalent among adolescents: 5–7 per cent reported that fear of injections may lead to avoidance of necessary dental treatment (Vika et al. 2006). In particular, girls were more prone than boys at avoiding dental treatment. This is in agreement with Liddell and Locker (1997) who found that women are more anxious about the risk of painful experiences; they are more prone to avoid pain and they have lower acceptance of pain.

The close relationship between BII phobia and dental phobia is only partly described by the stimuli that the patients are anxious about. During dental treatment BII stimuli are presented as dental injections and as procedures involving blood, like extractions, periodontal treatment and surgery. Patients who have intra-oral injection phobia may avoid dental injections because of their anxiety. Consequently, they are more likely to experience pain in the dental situation. Isolated fear of pain is a predictor of dental fear (McNeil and Berryman 1989; Skaret et al. 1998) and experience of painful dental care is the most potent stimulus in classical conditioning for dental anxiety. Studies have found that painful dental treatment, where the patient does

not perceive control of the situation, multiply the likelihood of developing dental anxiety (Milgrom et al. 1992; Skaret et al. 1999).

However, BII phobia is not synonymous with the patient developing high dental anxiety. There are differences in patients' perception and meaning of the painful experience (Liddell and Locker 1997). If patients recognize the pain as harmful to teeth and soft tissue, they tend to respond with more anxiety. This may reflect the patients' feeling of control. Patients' need and desire for control is of high importance in relation to dental treatment. Patients who desire control, but do not feel control in the dental situation, are the most dentally anxious (Law et al. 1994; Locker et al. 1997). This may partly explain why some patients with BII phobia develop dental phobia, whereas others do not become dentally anxious. Women tend to have a stronger desire for control and they also tend to be more dissatisfied with the level of control they feel in the dental situation, as compared to men (Liddell and Locker 1997).

Whereas BII phobia and specifically avoidance of intra-oral injections may cause dental anxiety due to painful dental experiences, studies have shown that intra-oral injections per se is a source for dental anxiety both in adults and children (Cuthbert and Melamed 1982; Milgrom et al. 1997). The pain experienced during dental injections may be the painful dental experience leading to dental anxiety. It is therefore of utmost importance that dental staff are aware of the potential of generalizing painful dental experiences.

It has been discussed whether dental phobia should be diagnosed as a subtype of BII phobia. De Jongh et al. (1998) argue that dental phobia should be considered a specific phobia, independent of the BII subtype despite the similarities between the phobias whereas LeBeau et al. (2010) justify that dental phobia is diagnosed as a BII phobia in the review for DSM-V.

Dental Health in Intra-Oral Injection Phobics

Avoidance of and delay in seeking medical care among patients with BII phobia may have serious health consequences (Kleinknecht and Lenz 1989; Öst 1992). BII phobia may be associated with avoidance of dental treatment that involves blood, injury and particularly a fear of intra-oral injections which may keep patients from having dental injections. Consequently, this fear prevents them from being able to undergo invasive procedures like extractions, drilling, filling and so on. Other procedures may be endured resulting in painful dental experiences.

Patients with dental phobia have a poorer oral health compared with the regular population. They have more decayed teeth and more missing teeth (Agdal et al. 2008). Patients with BII phobia have oral conditions similar to individuals not reporting dental anxiety (Agdal et al. 2010).

In a New Zealand population Poulton et al. (1998) found that when both blood or injection phobia and dental fear were present, the patients had worse oral health compared with individuals without comorbid fears. However, this was not the case in a Norwegian study where comorbidity did not impair the patients' oral health (Agdal et al. 2010).

Quality of Life in Persons with BII Phobia

Specific phobias in general are known to affect patients' quality of life (QoL) to various degrees. Becker et al. (2007) found no differences in impairment across specific phobias, whereas Depla et al. (2008) found that BII phobia and situational phobia were more significantly impairing

than either animal phobia or natural environment phobia. The impairment and reduced QoL in adults and adolescence with BII phobia may be based on the high comorbidity rates for psychopathology (Bienvenu and Eaton 1998; Depla et al. 2008) and marijuana abuse (Bienvenu and Eaton 1998). BII phobia is found to impair patients' ability to obtain medical treatment, which can have serious health consequences (Kleinknecht and Lenz 1989; Öst 1992); it also dissuades patients undergoing education involving medical procedures. For women BII phobia may increase their fear of becoming pregnant (Marks 1988; Öst 1992).

In intra-oral injection phobia the anxiety response is limited to dental procedures. Patients treated for intra-oral injection phobic had lower satisfaction with their health and self-esteem compared with a non-clinical sample before the phobia treatment. One year after the treatment there were no differences in life satisfaction between the intra-oral injection phobics and a non-clinical sample (Agdal et al. 2011).

Studies have shown that high dental anxiety has an impact on patients' QoL (Abrahamsson, Berggren and Carlsson 2000; Locker 2003; McGrath and Bedi 2004; Mehrstedt, Tonnies and Eisentraut 2004; Ng and Leung 2008). Crofts-Barnes et al. (2010) stated that there is enough evidence to conclude that there is a relationship between dental anxiety and all aspects of QoL.

Assessment of BII Anxiety

In order to separate anxiety from phobia, a diagnostic interview must be performed. In a clinical setting a range of questionnaires and surveys are available to measure patients' BII anxiety in the dental situation. Most of the instruments only measure subtypes of BII. To date no instruments are available that measure the patients' fear of intra-oral injections. The Injection Phobia Scale-Avoidance (IPS-A; Öst) is useful for measuring fear of extra-oral injections (only one out of 18 items measures intra-oral injection fear). Injection Cognitions may also be used in relation to injection fear (Milgrom et al. 1997). This instrument may assist the clinician in detecting the patients' catastrophic thoughts, which may be of importance for further treatment. Also, the Modified Dental Anxiety Scale (MDAS) (Humphris, Morrison and Lindsay 1995), which includes one question concerning dental injections, may be used. The Mutilation Questionnaire (MQ; Klorman et al. 1974) and the Blood Injury Questionnaire (BIQ) may be used to measure the BII subtype blood-injury phobia (and fainting) (Merckelbach et al. 1999). The latter may be useful based on the congruence of BII and dental phobia.

Questionnaires intended to measure dental anxiety may also be applied based on the correlation with BII phobia. Frequently used scales in this area are the Dental Anxiety Scale (DAS) (Corah 1969) and the Dental Fear Survey (DFS) (Kleinknecht, Klepac and Alexander 1973). The Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) may be used for children (Cuthbert and Melamed 1982). Scales and surveys are most often concerned with identifying which situations may be anxiety provoking. The instruments can also be used to measure the level of anxiety. Furthermore, administering the instruments may also communicate to the patients that you as a clinical dental health professional are interested in their fear and anxiety related to the dental situation. More sensitive scales are needed for measuring BII phobia in the dental situation. Clinical experience highlights the necessity that the dental staff invite the patient to reveal concerns in connection with dental treatment. The dentist should not ignore signs of anxiety in connection with injections and invasive dental procedures.

In a clinical setting the dental staff may simply ask the patients 'how do you feel about receiving dental treatment?' Patients appreciate when dentists are concerned with their emotions and well-being by showing empathy and communicativeness (Corah et al. 1988). Simply asking patients how they feel and what makes them anxious is easy and important in order to get an impression of the patient's fear and also to facilitate a relationship before treatment. Significant information about the patient's concerns may be revealed when the patient is open-hearted and motivated to share thoughts and catastrophic beliefs. A diagnostic interview is, necessary in order to gain sufficient knowledge and to offer a proper treatment for the BII phobia.

Clinical Challenges

The dentist will often experience the BII phobic patient as someone who is reluctant to have intra-oral injections. The main clinical challenge will be whether dental treatment should be carried out without anaesthetics or if the dentist should persuade the patient to have an injection. BII phobic patients would therefore either undergo painful dental treatment or they would avoid necessary dental treatment. If the dentist conducts dental treatment based on persuasions or performs dental treatment without anaesthesia, this may lead to an increased anxiety level in patients with BII fear and may also raise ethical considerations. For the clinical dentist it is very important to gain comprehensive knowledge about symptoms, consequences, maintenance factors and treatment methods in relation to BII phobia.

Though the onset of BII phobia is in childhood, the mean in different studies ranges from 5.5–9.4 years of age, BII phobia may also have a later onset. A painful experience or fainting episodes with the sense of not having control are key elements in developing the phobia. But other associative and non-associative means of acquisition are very common. The dentist should be aware of the pathways for inducing BII phobic reactions so that they concentrate on managing injections and situations involving blood in a careful manner, giving the patients as much control as possible.

To overcome the phobia the patients have to confront what they are afraid of. They need to verbalize their catastrophic beliefs in connection with the injection. Dentists should be aware that BII phobic patients are not only afraid of the pain they feel during mucosal penetration and injection of the anaesthetics. Painful penetration and injection of the local anaesthetic together with fear of bodily injury caused by the injection are the most common complaints (Kaakko et al. 1998; Milgrom et al. 1997). Patients may also be sensitive to the physical changes they experience after the dental injection. Some patients fear the feeling of numbness and some fear that they will be unable to breathe and swallow. Others fear the sense of disgust, nausea and fainting. Only when dentists are aware of the patients' catastrophic beliefs and negative thoughts, can they start helping the patient to overcome BII phobia. Acknowledging that patients are anxious about painful dental procedures is valuable, but has limited value unless one is aware of how the painful experiences are internalized (Liddell and Locker 1997).

Fainting is, as mentioned, relatively common in BII phobic patients. One must be especially aware of children reporting almost fainting or actually fainting, or where their parents claimed to have fainted in connection with BII stimuli. These children may be especially vulnerable to fainting in relation to dental treatment. It is important that health professionals can offer a treatment that prevents fainting in these patients in connection with examinations and dental

treatment. Previous studies have shown that Applied Tension (Öst and Sterner 1987) is an effective method to prevent fainting during exposure treatment to BII stimuli. It is suggested that Applied Tension is used routinely for patients who experience fainting in the dental situation.

Since pain is the most common complaint among injection phobics and phobic patients report more and longer lasting pain during injections than non-fearful patients (van Wijk and Makkes 2008), dentists should try to reduce the pain experienced. Surface anaesthesia is recommended. The anaesthesia of the mucosa relieves pain, but also reduces the anticipated anxiety of pain. To reduce the sensation of pressure when injecting the anaesthesia, the patients should be given a few drops of anaesthesia initially. After a pause and in agreement with the patient, a new injection should be given by slowly injecting the anaesthetic. In the case of blocking the mandibular nerve (inferior alveolar nerve), it may be necessary to give several minor doses of anaesthetic before the main dose is given in the desired location. When palatal injections are necessary they should be given last. In cases where the patient is very fearful of pain, injections can first be done through the already numbed gingival papillae. Some patients may also fear that the anaesthetics won't work or they claim that they are 'hard to anaesthetize'. For these patients double doses with anaesthetics may be given initially.

In general it is important to give the patients information tailored to their concerns and fears in relation to the dental procedures. Adapted customized information may increase the patient's feeling of control and this may lead to decreased fear, and, furthermore, the pain perception may be positively affected (Baron, Logan and Hoppe 1993).

Case Presentation

Tom is a socially well-functioning boy. He is 11 years old and he is generally satisfied with his life. Three times a week he practises with the local football team. During the summer months his team plays matches on weekends. Otherwise, Tom's interests include skiing and being with friends. Tom is a social boy who enjoys school and generally he has few problems. Nevertheless, Tom has one problem. He is afraid of going to the dentist. He didn't use to be afraid. Or at least, he has always gone to the dentist for yearly check-ups.

Some years ago, Tom needed a tooth pulled out. After an unsuccessful attempt to extract the tooth without any sedation, the tooth was finally extracted when Tom was sedated with a benzodiazepine. The years following the extraction, Tom did not need dental treatment. He coped seemingly fine with the annual dental surveys, until recently when it was ascertained that he has a hole in an upper jaw molar. Tom refuses to have local anaesthesia. On the other hand he does not want the tooth to be drilled without having anaesthesia. The dentist has suggested that he should try sedation with a benzodiazepine again, but Tom refuses. The situation has become difficult. Though Tom understands that the tooth has to be pulled out, he cannot do it.

Tom comes to the Center for Odontophobia (CFO) a couple of months later. The referral says: 'The patient is referred because of anxiety of dental treatment and especially high anxiety when needles are needed. The patient refuses to drink the Dormicum (midazolam) liquid because he feels it will make him dizzy and nauseous. The patient seems to be afraid of losing control'.

The first person meeting Tom and his mother is a clinical psychologist. During the initial appointment, the psychologist finds out why Tom is afraid and what he is afraid of. Like the

majority of patients at the CFO Tom begins by speaking about the episode he perceives as the start of his anxiety. He says that he has had only one dental injection before and that it made him very dizzy. He also passed out when he received a vaccine in the public health care. During the conversation it emerges that fainting is not Tom's biggest fear. The following four negative thoughts are central in his avoidance of injections and dentistry:

- The idea that the needle is going into his skin is very sickening (stomach shrinks; feels that he will throw up).
- He is afraid of the pain of the needle and the injection of the anaesthetic agent. He ranks the pain as 8–10 on a pain scale from 0–10. In addition, he believes that the pain will last for 10–20 seconds.
- He is afraid that the dentist will make errors when setting the anaesthetics. For example, the dentist may insert the needle too deep into the tissue and hit something that he shouldn't. Likewise the dentist may hit the root of the tooth and cause more pain.
- He is afraid of the contents of the ampoule and he thinks it could be dangerous for him.

At the dentist

Tom's first meeting with the dentist is in the dental room. For successful treatment it is important that the dentist creates a good dentist–patient relationship. The dentist asks Tom how he feels about coming to the treatment. Tom responds that he hasn't dreaded it very much. Now, while in the waiting room he was a bit afraid, but the psychologist had said that he would not 'do any dentistry' the first hour, thus, he feels calm. The dentist asks if he has some new thoughts about dental treatment during the time since his appointment with the psychologist. She asks him to rephrase with his own words what makes needles, dental injections and dental treatment so difficult for him. While Tom talks about his thoughts the dentist encourages him. This is not the time for the dentist to challenge Tom's thoughts. Next, the dentist asks how convinced Tom is that his beliefs will actually happen during dental care.

As Tom has experienced fainting in connection with the syringe, there is a reason to believe that Tom has a vasovagal reaction when in contact with syringes. The vasovagal reaction leads to dizziness and fainting due to a drop in blood pressure. Using a method called Applied Tension the drop in blood pressure will be counteracted. Tom is instructed in an exercise where all major muscle groups are activated. He receives a mirror and is instructed to contract the big muscles in his arms, chest and legs for 15 seconds. After 15 seconds he sees how his face turns red. This provides concrete feedback that the blood has flowed to the head. The dentist asks Tom what he thinks about this exercise. Tom replied that it is good because now he knows that he can counteract fainting.

Thereafter the dentist starts to inform him about the anxiety treatment. An anxiety-avoidance curve is drawn on a blackboard in front of the patient. During drawing, the dentist explains how the patient feels a quick and sudden increase in anxiety when he is in situations that make him afraid. The dentist uses the term SUD (Subjective Units of Disturbance) to measure the patients' subjective anxiety. SUD=100 corresponds to the highest anxiety the patient has experienced at the dentist, whereas SUD=0 is no anxiety. If we do not escape from the situation, but try to remain in it, we experience a reduction of anxiety over time. If the patient repeats the same exercise the fear will reoccur, but not be as high as the first time. The more

control the patient experiences during the exposure, the larger the anxiety reduction. Emphasis is put on the fact that Tom will not, during the anxiety treatment, experience higher anxiety than he has previously experienced. Moreover, the dentist focuses on the need for Tom and the dentist to work as a team where both are mutually dependent on the other's efforts. Otherwise, treatment is based on the fact that Tom always will feel in control of the situation, the treatment is based on the gradual approach and that they will always have enough time. Before the exposure starts, the dentist makes sure that Tom finds that nothing is unclear.

For Tom to master dentistry, it is important that he can tolerate having dental injections. Therefore, the dentist starts with exposing him to the syringe. The dentist shows how the different parts of the syringe are put together. As Tom fears that the anaesthetic can be dangerous to him, the dentist uses time to explain what the ampoule contains. It is produced by a pharmaceutical company and that all ampoules that look the same contain the same thing. Moreover, the dentist informs Tom that she has never heard of anyone who has reacted to the anaesthetic in a way that suggests that it would be dangerous. The dentist then asks if there is any reason to believe that Tom is different from others, or whether it would be reasonable to assume that the drug is not dangerous for him as it is not dangerous for others. Tom responds affirmatively to this.

The dentist opens the casing for the needle and they look at the tip together. Tom has thoughts about the needle being disgusting/sickening as it must protrude through the mucosa. Thus, the dentist makes a schematic drawing of the anatomy of tissues under the mucosa membrane. Specifically, good information is crucial so that Tom will have a better understanding of what happens when the dentist injects the anaesthesia. Tom has thought about the dentist extending the needle incorrectly and that the needle may be stuck into a root. Using a skull the dentist teaches Tom about the mouth's anatomy. The dentist shows how the nerves are in the bone and how they go into each tooth through the apex. To anaesthetize a tooth in a good and quick manner it is of utmost importance for the dentist to make the injection correctly. Tom must reconsider his fears. Is it possible for the dentist to stick into the roots of the teeth and is it likely that the dentist will make errors that will cause harm?

Tom is introduced to surface anaesthesia. The surface anaesthesia is put on the mucosa for two minutes. Directly after removing the cotton roll with anaesthetic the dentist asks what Tom feels. She pushes a probe against Tom's fingers before she pushes it in a similar manner to the mucosa membrane which is numbed. Tom is surprised and delighted to note that the anaesthetic has been effective. Moreover, the dentist exposes Tom by gradually bringing the syringe closer and closer to Tom's mouth. The steps are modelled using instruments that Tom does not associate with the syringe. For each step Tom rates his anxiety on the SUD scale. The first session ends with the needle touching the mucous membrane without penetrating the mucosa. Tom says that SUD = 25 in the final stage.

Second session

At the beginning of the session the dentist asks if Tom has any new ideas or negative thoughts about the injection. Tom disconfirms that he has any new negative thoughts. The dentist and Tom repeat the key elements in the anxiety-escape curve and the dentist repeats the necessity of teamwork and that Tom always will have the control during exposure. The dentist exposes Tom by making the exposure steps progressively more equal to a regular insertion of the needle. She pushes the needle against the mucosa. Thereafter she holds the needle pressure against the mucosa and counts to five or until Tom takes up his hand signalling 'quit the

exercise'. Gradually Tom feels that the anxiety fades. When the fear feels low, it is easier to go to the next step and Tom agrees to try one spot without injecting anaesthetic. He is experiencing pain 3–4 (on a scale of 0–10) and SUD = 40. He is surprised that he did not find it as disgusting/sickening as he had predicted. During the session Tom receives four spots whereof in two spots a few drops of anaesthetic are injected. The session ends with a summary of what has been done during the appointment. What happened and what did Tom anticipate? The summary is part of raising awareness that there has been a change in thought and in the anxiety level.

Third session

This is Tom's last appointment. During the previous appointment he practised inserting the needle through mucosa and the feeling of being anaesthetized. He has had a sense of coping and of being successful which he had not previously had in the dental situation. During the anxiety treatment, he has not felt the feeling of disgust or nausea, which he had feared and expected. Tom is very motivated to continue with the dental treatment which he knows he needs. His motivation contributes to his will of having enough anaesthetic to sedate an upper molar. During the insertion of the needle and the anaesthetic injection Tom has SUD = 30.

Then the dentist exposes him to the drills. The exposure starts by showing the drills and then by explaining how to use the various drills. Thereafter, the dentist touches the tooth with the drill while counting to one. Then she counts to two and then to three. Gradually, when experiencing that the drilling is not inducing pain, Tom confirms that he becomes calmer and the anxiety fades away.

At the end of the last appointment, the dentist and Tom review the thoughts he had when he first came to treatment. The dentist makes a new assessment of what will, or may happen when he undergoes dental treatment, when he gets a syringe, or the tooth is drilled. He expresses delight that what he feared most will not occur.

A temporarily filling is put in the tooth that is drilled. The dentist then writes a letter to the referring dentist about what Tom had done during the anxiety treatment and how he should be welcomed in the future. A few weeks later, the dentist reported that the tooth was now filled and the treatment at his general dentistry was a positive experience.

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Dental Anxiety in Children and Adolescents

Gunilla Klingberg

Definitions of Dental Fear and Anxiety and Dental Behaviour Management Problems

Fear represents a natural emotion based on a perception of a real threat. Especially young children frequently encounter new and unknown situations that are perceived as fearful. Anxiety on the other hand is associated with fear reactions towards a situation of anticipated but not realistic threat. It is an abnormal reaction and a disorder like fear may hinder the child in different situations.

In dentistry dental fear and dental anxiety are two different entities but are often used together and are even interchangeable. However, there is a distinction. Dental fear (DF) represents a reaction to a specific external threatening stimulus, a normal emotional reaction to threatening stimuli in the dental situation. Dental anxiety (DA) represents a state where the child is evoked and prepared for something to happen. It is not attached to an object but rather, it is a non-specific feeling of apprehension, associated with more abnormal conditions. Dental phobia (DP) represents a severe type of dental anxiety and is characterized by marked and persistent fear of clearly discernible situations/objects and is diagnosed according to clinical criteria (DSM-IV). DP interferes significantly with daily life and results in avoidance of necessary dental treatment or enduring treatment only with dread. In research, DF and DA have often been investigated without clear distinction and in this chapter, dental fear and anxiety (DFA) will therefore be used to describe psychological reactions that negatively interfere with children's readiness to go through dental treatment.

Children are more prone to react overtly if they feel that something is wrong; if they are not treated in a way they like; or if they feel uncomfortable or perceive pain. For adults these kinds of behaviours are not accepted; something that the individual learns when growing up as part of the social norms. However, it should be kept in mind that despite not showing dislike or discomfort through behaviour, adult patients may well experience the same feelings of discomfort

as the child, but just not show this openly. So, in contrast to dental care for adults, behavioural or cooperational problems are common in child dentistry. The term for this is dental behaviour management problems (DBMP), which is defined as uncooperative and disruptive behaviours resulting in delay of treatment or rendering treatment impossible. Thus, DBMP is recognized and defined by the dentist. It represents the dentist's point of view and does not necessarily correspond to the child's perspective or with the level of DFA perceived by the child.

Relationship between Dental Fear and Anxiety and Behaviour Management Problems

So is it then possible to distinguish between DFA and DBMP? There is no simple answer to this. No dentist is likely to miss a child presenting with DBMP. Most clinicians will recognize children with inadequate understanding, maturity or ability to cooperate and probably see this as DBMP. But it would be a misconception to just say it is DBMP. Looking at the situation from the child's point of view, he or she at some point probably also experiences some level of fear. As a contrast to the child who is acting out, another child may instead be whispering to his or her mother, not making any eye contact with the dentist and distancing him- or herself from interaction. This would probably be recognized as DFA by many dentists. Children with DFA can be outgoing in their general behaviour, but are sometimes more passive and silent during treatment. It is therefore important not to take cooperative behaviours alone as a sign of the child feeling comfortable. If absence of disruptive patient behaviours is taken as a guarantee for feelings of ease with the situation, there is a risk of overlooking DFA. By not taking DFA into consideration and by not providing a treatment that is tailored for the individual patient, the dentist may even cause more anxiety problems. Apparently there is a distinction between DFA and DBMP, but there is also some overlap. The degree of overlap probably varies in different populations depending on age, maturity, cognitive properties, previous experiences of dental care, dental problems and so on. A Swedish study from the 1990s on 4-to-11-year-old children showed that 27 per cent of the children with DBMP also had DFA (Klingberg et al. 1995). Looking at the children with DFA, it was found that 61 per cent in this group also presented with DBMP (Figure 6.1). Consequently much of the research in this field does not distinguish between DFA and DBMP. For example, when looking at the literature one will find several studies where the study sample comprises patients referred to specialists because of disruptive behaviours in combination with dental caries and where the researchers evaluate the patients or follow-up treatment using DFA as an endpoint. Often the treatment concerns behaviour management

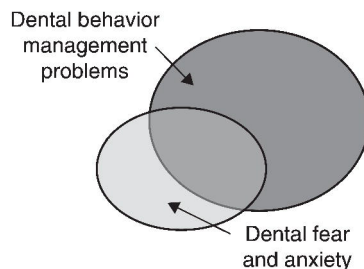


Figure 6.1 The relationship between DFA and DBMP. Modified from Klingberg et al. 1995

techniques, i.e. methods enabling the dentist to carry out treatment and not aiming at reducing fear and anxiety. So for many dentists the child's behaviour is the main issue even in research, while the child's perspective may be something rather different, namely fear and anxiety.

Prevalence

There are several reports on the prevalence of DFA and DBMP in the literature, but it is often difficult to compare studies and there are two main reasons for this. The first concerns the differences in definition and measurement of DFA or DBMP and the second concerns the variation in study design and patient materials.

Both DBMP and DFA can be measured in several different ways. Starting with DBMP, most studies use observation of the child's reaction or behaviour during dental treatment (behavioural ratings). The observations are usually made by a dentist or another person (present in the room or based on videotapes) and there are several well-known rating scales, for example the Frankl Scale (Frankl, Shiere and Fogels 1962). The assessments can be made at a detailed level for different parts of the treatment or at different time intervals, or as global assessments of the total treatment session. The most common way to measure DFA is by self-reports of anxiety by the child or by the accompanying parent (most often the mother) using psychometric scales. Parents are generally used as informants or as proxy for children under the age of 13. After that adolescents answer for themselves. It is known that the agreement between assessments of child DFA made by child or parent is far from perfect and therefore it is important not to combine data gathered from parents and children in research (Gustafsson et al. 2010). The most frequently used test for DFA is the Children's Fear Survey Schedule – Dental Subscale (CFSS-DS) (Cuthbert and Melamed 1982). This test consists of 15 items scored on Likert-type scales ranging from 1 (not afraid at all) to 5 (very afraid) with a possible total score range from 15–75. The CFSS-DS was originally designed in a version where the child answered by using a fear thermometer, but today it is mainly used as a self-report in two versions – one using the child as informant and one where the parent is the informant. DFA is usually defined as scores equal to or exceeding 38 or 39 in the parental version of CFSS-DS (Klingberg and Broberg 2007). For children the cut-off levels vary more according to different studies (from 37 to 42) (Klingberg and Broberg 2007). When deciding on psychometric tests for DFA it is important to acknowledge that tests developed for adults are not generally applicable for children and adolescents, regardless of whether the child or an adult proxy is used. Further, as pointed out above, if a test like the CFSS-DS has both a child and a parental version this does not mean that the two versions are identical.

Study design is important in all studies, including prevalence studies. Many studies on DFA and DBMP comprise selected patient materials, often patients that have been referred to specialist clinics or patients at university clinics. These groups are not necessarily representative of the background population and thereby the sampling procedures introduce bias in many prevalence studies. It is likely to assume that patients seen at a dental clinic have greater dental treatment needs than those not seeing a dentist and, as some of these clinics provide dental care at lower cost, there is also potentially a bias concerning socioeconomic background. Further, young children in need of dental treatment may have an increased risk of pain experiences owing to cognitive development and difficulties with understanding and coping with discomfort, which again may result in disruptive behaviours and fear reactions. These are

examples of biases that could result in an overestimation of the prevalence of DFA and DBMP in these groups compared with the background population. Further, in order to include sufficient numbers of patients the study group has to be quite large and preferably the study design should also include a power calculation prior to deciding on size of the study population. Looking at children and adolescents it is not wise to have a too broad age range because foremost cognitive and socioemotional properties vary depending on age and maturity. As discussed above, it is advocated that the same kind of informant is used for the whole study population (i.e. either the child or the parent if using self-reports). A selection procedure ensuring a larger sample that mirrors the background population in terms of age, gender, socioeconomic factors, oral health and so on will lead to a higher quality of the study and more valid results.

So what do we then know about the prevalence of DFA and DBMP? A review by Klingberg and Broberg from 2007 identified 17 publications based on 15 populations surveyed for DFA or DBMP (prevalence and comparisons between boys and girls and between older and younger children) published between 1982 and 2006. Performing a new search of the PubMed database, using the same search terms and criteria for inclusion for the period 2007 through 2011 resulted in an additional two studies on DFA, both using CFSS-DS as measurement instrument (Table 6.1). No additional studies were found regarding DBMP. One of the new studies differed from those identified in 2007 regarding prevalence of DFA (Lee, Chang and Huang 2007). This was a survey from Taiwan including a large sample of 5–8-year-old children with a reported prevalence of 20.6 per cent. The authors describe the population with high prevalence of caries and also state that unmet treatment needs and dental pain may be one reason for the relatively high prevalence of DFA. A higher prevalence of DFA has also been reported in other populations with high caries prevalence as in populations with low socioeconomic level (Klingberg et al. 1995; Raadal et al. 1995; Raadal et al. 2002).

The studies published since 1982 have mainly been carried out in North America and in western and northern Europe. The studies include patients from 4–18 years of age and the number of subjects included in the studies varies between 223 and 4061. Several different methods were used to assess DFA and DBMP with CFSS-DS being the most common. It should, however, also be pointed out that even though several studies used the same measure, the differences in cut-offs defining DFA and DBMP between different reports possibly also affected the reported prevalence figures. Altogether there were only two studies on DBMP, which is interesting, since most studies on treatment of patients with DFA/DBMP define their study populations based on DBMP. When including all 14 study populations the pooled prevalence (totalled number of individuals with DFA out of totalled numbers of individuals surveyed) of DFA turned out to be 11.8 per cent. However, as there were two outliers, one population from a low income background with a reported prevalence of 19.5 per cent (Raadal et al. 1995) and the study from Taiwan with 20.6 per cent DFA (Lee et al. 2007), a pooled prevalence was also calculated for the remaining 12 study populations and found to be 8.8 per cent. Based on this result it is fair to estimate that around 10 per cent of children and adolescents experience DFA. Regarding DBMP no new studies were found and the reported pooled prevalence of 9.6 per cent reported by Klingberg and Broberg (2007) is still relevant. Taking the new studies into account the results confirmed previous findings that the prevalence of both DFA and DBMP was higher in populations of younger children as compared to older children and adolescents, probably reflecting a normal psychological development. Young children understand dental treatment differently than older children and younger children also

Table 6.1 Prevalence (%) of DEA and DBMP and comparisons according to gender and age. Modified from Klingberg and Broberg 2007.

Reference	Country	N	Age (years)	Prevalence		Comparison		
				DEA (%)	DBMP (%)	Boys vs. girls	Younger vs. older	Endpoint; Cut-off
Informant								
Parent								
CFSS-DS								
Klingberg et al. 1994a	SE*	3166	4-11	6.7	—	tot no diff 9-11: b>g	y>o	CFSS-DS>38
ten Berge et al. 2002	NL	2144	4-11	6	—	g>b	no diff	CFSS-DS≥39
Lee et al. 2007	TW	3597	5-8	20.6	—	g>b	y>o	CFSS-DS≥38
Wogelius et al. 2003	DK	1281	6-8	5.7	—	no diff	y>o	CFSS-DS≥38
Child								
CFSS-DS≥								
Raadal et al. 1995 [#] and Milgrom et al. 1995	US	895	5-11	19.5	—	g>b	y>o	CFSS-DS≥40
Akbay Oba et al. 2009	TR	257	7-11	14.5	—	no diff	y>o	CFSS-DS≥38
Nakai et al. 2005	JP	1250	8-15	not calc	—	g>b	no diff	CFSS-DS
Chellappah et al. 1990	SG	505	10-14	13.5	—	g>b	—	CFSS-DS≥42
Alvesalo et al. 1993	SF	828	12-13	not calc	—	g>b	no diff	CFSS-DS
DAS/MDFS/DFS								
Murray et al. 1989	CA	223	12	9.4	—	g>b	—	DAS ≥ 13
Taani et al. 2005	JO	1021	12-15	10	—	g>b	—	modified DFS – high dental fear

(continued)

Table 6.1 (cont'd).

<i>Reference</i>	<i>Country</i>	<i>N</i>	<i>Age (years)</i>	<i>Prevalence</i>		<i>Comparison</i>		
				<i>DEA (%)</i>	<i>DBMP (%)</i>	<i>Boys vs. girls</i>	<i>Younger vs. older</i>	<i>Endpoint; Cut-off</i>
Bedi et al. 1992	GB (Sc)	1076	13-14	7.1	—	g > b	—	DAS ¹² ≥ 15
Milgrom et al. 1992	SG	1564	13-15	12.2	—	no diff	—	DFS ≥ 60
Bergius et al. 1997	RU	288	13-18	12.6	—	g > b	—	DAS ≥ 15
Thomson et al. 1997	NZ	691	15	10.9	—	no diff g > b	—	DAS ¹² ≥ 13
Skaret et al. 1998	NO	571	18	19	—	g > b	—	DFS > 59
Informant Dentist								
Holst and Crossner 1987	SE	2273	3-16	—	8	y: g > b o: b > g	y > o	R&K neg/no accept
Klingberg et al. 1994b	SE*	4061	4-11	—	10.5	no diff	y > o	BMP-DR

Notes

*, # Indicates two publications from the same study population.

BMP-DR – Behaviour management problems retrospectively from dental records (Klingberg et al. 1994); CFSS-DS – Children’s Fear Survey Schedule – Dental Subscale (Cuthbert and Melamed 1982); DAS – Dental Anxiety Scale (Corah 1969); DFS – Dental Fear Scale (Kleinknecht, Klepac and Alexander 1973); R&K – Rud and Kisting (Rud and Kisting 1973).

have fewer experiences of treatment, especially if they include experiences of discomfort and possible pain. These are abstract phenomena that require rather advanced cognitive skills and emotional regulation to fully manage. Thus, younger children may find dental treatment situations not only as novel but probably also as more stressful and fear-provoking. Further, when looking at differences between the sexes, a majority of the studies on DFA reported more dental anxiety in girls than in boys, while differences were not as apparent in the case of DBMP. So based on the literature it is fair to assume that every tenth child and adolescent has DFA and that also one out of 10 children and adolescents will present with DBMP. But as DFA and DBMP are not identical, the total group of children and adolescents with DFA or DBMP constitutes more than 10 per cent of the population under the age of 19 and more girls than boys are affected.

Looking at these reports on the prevalence of DFA and DBMP it should also be pointed out that we are discussing mainly healthy or normal children, which in a way is problematic. It is usually assumed that up to at least 10 per cent, maybe even up to 20 per cent or more, of the child population have disabilities or chronic health conditions that significantly impact on their day-to-day functioning (Merrick and Carmeli 2003). In population-based studies it is unclear if these children are included, excluded or if they declined participation. So apparently we have limited knowledge about a proportionally large group of the child and adolescent population. There are some indications of more DBMP in, for example, children with attention deficit hyperactivity disorder (ADHD) (Blomqvist et al. 2006) and children born preterm (Brogårdh-Roth, Matsson and Klingberg 2011), while children who have undergone treatment for cancer did not have more DFA than their healthy counterparts (Wogelius et al. 2009). Looking at studies in adult patients with learning disabilities there are reports of more DFA in these groups of patients (Gordon, Dionne and Snyder 1998; Martin, Kinoshita-Byrne and Getz 2002).

Psychological Factors Associated with the Development of DFA and DBMP

The review by Klingberg and Broberg (2007) also assessed DFA and DBMP in relation to general fear and anxiety and to general behavioural problems. They found 16 papers, based on studies in 11 populations (60 to 3166 individuals) that met the criteria for inclusion in the review. Further, to analyse temperamental factors and DFA/DBMP the authors identified seven studies, based on seven populations (50 to 203 individuals) that were reviewed. From this material it was concluded that there was a positive relationship between general fears and DFA, while there were conflicting results concerning the relationship between DBMP and general fears. General fears were also linked to age as younger children are likely to have more fears and probably also experiences of higher fear levels compared with their older counterparts (Klingberg and Broberg 2007).

Looking at the association between DFA/DBMP and general behavioural problems (internalizing and externalizing problems) there seems again to be uncertainty as there are studies both supporting and rejecting such a relationship. However, Klingberg and Broberg (2007) concluded that there was some support for a relationship with both DFA and DBMP and that children at risk of developing internalizing disorders tended to score high on DFA. Regarding DBMP the picture was more complicated, partly as a result of the heterogeneity of DBMP. The reason for this was that children with DBMP had been recruited and identified

differently in different studies. Often they constituted children referred because of cooperation problems, in some cases it was likely to assume that the origin of the cooperation problems was primarily due to negative experiences in conjunction with dental treatment, probably foremost pain. Further, some of the patients with DBMP were identified as having neuropsychiatric problems. In the case of neuropsychiatric problems it is important to acknowledge that this incorporates a substantial group of diagnoses affecting around 5 per cent of the child population (Gillberg 1995). It can be expected that children with attention difficulties like ADHD, who have difficulties adjusting their activity level to various demands, will have greater difficulties in coping with the demands of the dental treatment situation, which has also been shown (Blomqvist et al. 2006).

Difficulties approaching novel situations and unfamiliar people have often been reported to characterize children with DFA/DBMP. This is often referred to as temperamental factors, which constitute an interesting field for research concerning the Aetiology of DFA/DBMP. Temperament is a personal emotional quality; it is regarded as moderately stable over time; it appears early in life; and is also believed to be under some genetic influence. Regarding an association between DFA/DBMP and temperamental factors, there seems to be more clear evidence (Klingberg and Broberg 2007). DFA was described as being more linked to temperamental traits like shyness, inhibition and negative emotionality, while DBMP was related to temperamental traits like impulsivity and activity.

So looking at possible psychological factors associated with the development of DFA and DBMP it is clear that psychological development is of importance. The young child's way of reasoning, understanding and handling emotional reactions is different from that of an older child or adolescent. Some would probably call this maturity, but maturity alone does not explain why DFA and DBMP occur. Both DFA and DBMP are complex phenomena, they are related and still differ. Apart from the psychological factors there are several modulating factors that have to be taken into account. For example, pain and discomfort during dental treatment, the treating dentist's capacity to care for the child and help him/her to feel secure and able to cope with the treatment. Also, parental factors like supportive attitude, attachment and so on play important roles. Behind this there are social and socioeconomic issues that will impinge on parent and family. Altogether it is very clear that DFA and DBMP in children and adolescents have a multi-factorial background. As dental health professionals we can probably reduce the risk of DFA and DBMP at some level. Firstly, as the dental treatment and the understanding of the treatment are basic, a postponement of dental treatment needs is important. In other words, dental health promotion and prevention may reduce DFA and DBMP. Second, when we meet and treat young patients, great efforts should be made to reduce pain and discomfort and to make the child feel safe, secure and having a sense of control during treatment.

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Part II

Treatments

Cognitive Behaviour Therapy

Principles, Procedures and Evidence Base

Lars-Göran Öst and David M. Clark

The Birth and Early Development of Behavior Therapy

Some early examples of what later became called behaviour therapy were seen in the USA in the 1920s and 1930s. John Watson, the father of behaviourism, published a famous article in 1920 describing how fear was installed and later generalized in a healthy young male baby, little Albert. However, less well known is a paper by one of Watson's graduate students, Mary Cover Jones (1924), describing the treatment of a three-year-old boy with a phobia of white rats, rabbits, furs and feathers. She used direct conditioning and modelling principles with a successful outcome. Another early example of applying principles of learning psychology is the paper on enuresis from 1938 where Hobart Mowrer and his wife presented the 'bell-and-pad' method based on classical learning principles, in what very well may be the first randomized controlled trial within psychiatry as a whole.

In the 1940s a South African psychiatrist, Joseph Wolpe, started to develop a treatment based on his theory of reciprocal inhibition. His reasoning was that a response innervated by the parasympathetic branch of the autonomic nervous system (e.g. relaxation), could be made to inhibit a response innervated by the sympathetic branch (e.g. fear or anxiety). In the 1950s he developed systematic desensitization (Wolpe 1958), which is still considered an evidence-based method for specific and social phobia (see also Chapter 12). Wolpe originally worked with real phobic stimuli, but since it was difficult to arrange confrontation with live stimuli he later chose to present the stimuli verbally to the patient who imagined being in the real situation.

During the same period developments were taking place in England and the USA. In London, Hans Eysenck, the first professor of psychology at the Institute of Psychiatry, heavily criticized psychoanalysis in a paper from 1952, concluding that it was no more effective than no treatment, i.e. the passage of time. In the 1950s and 1960s various people working at the Institute or collaborating with researchers there developed new treatment methods and methodologies for use in clinical research. Perhaps the most important of these was Monte Shapiro,

who was head of the clinical teaching section at the psychology department. In that position he was responsible for the clinical training of a large number of early British behaviour therapists and was the first to develop a way to perform behaviour analysis of the individual patient. Shapiro's focus on the experimental study of the individual patient also led him to develop the first single case design (A–B–A design) as early as the 1950s (Shapiro and Ravenette 1959), at least 10 years ahead of American developments in this methodology.

The English development of behaviour therapy was very much fuelled by a critique of the dominant psychological treatment at that time, psychoanalysis and psychodynamic therapy. The critique was both at a theoretical level, arguing that the psychoanalytic theories were either proven wrong or not subjected to scientific scrutiny, and at a practical level, highlighting the weak effects of psychoanalysis and the lack of evaluation in most instances.

Jack Rachman, a South African psychologist, moved to London in 1959 and worked with Eysenck. Together they started the first scientific journal in behaviour therapy, *Behaviour Research and Therapy* in 1963, which to a large extent was run by Rachman even if Eysenck was the chief editor initially. In 1974 Rachman succeeded Shapiro as head of the clinical section of the psychology department. He made important theoretical contributions in several areas, but his early research has primarily focused on obsessive-compulsive disorder (OCD) where he performed experimental studies on exposure and response prevention (ERP) at an early stage. The ERP method itself was developed in 1966 by another English psychologist, Victor Meyer, at Middlesex Hospital in London. The same year the first randomized controlled trial (RCT) of psychological treatment for agoraphobia (Gelder and Marks 1966) came out of the Institute of Psychiatry.

In the United States there was one isolated event in 1954 when Ogden Lindsley (one of Skinner's students) reported on the use of operant learning principles in the treatment of schizophrenic patients at a hospital in Waltham, Massachusetts, using the term behaviour therapy for the first time. This was, however, not a journal article and basically went unnoticed by clinicians within psychiatry. A decade later Theodore Ayllon and Nathan Azrin published a paper, and in 1968 a book, on the token economy, a ward programme for severely hospitalized schizophrenics at the Anna State Hospital in Illinois. They showed that a combination of social (praise) and tangible (tokens) reinforcers could activate these patients to a very large extent. From the mid-1960s a large number of RCTs started to come out of American universities, first with mainly analogue (student) samples and later with patients fulfilling diagnostic criteria. The RCTs initially focused on specific phobias, but then on social phobia, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, depression and schizophrenia. In children the early research efforts were focused on externalizing disorders such as conduct disorder, oppositional defiant disorder and attention deficit hyperactivity disorder (ADHD). Research on anxiety disorders in children did not start until the 1990s even if a few specific phobia studies were published earlier and the first RCTs on depression also came in the early 1990s.

The second time behaviour therapy was used in scientific writing was in 1958 when Arnold Lazarus, a South African psychologist, published an article in the *South African Medical Journal* describing 'New methods in psychotherapy'. The following year Eysenck published the important article 'Learning theory and behavior therapy' in the *Journal of Mental Science*. In the early 1960s the concept behaviour therapy came to be used more generally by the proponents of this new form of treatment that was primarily based on learning psychology principles (both classical and operant conditioning) and later social learning as described by Albert

Bandura (1969). This was also seen in the two scientific journals that were launched in the 1960s: *Behaviour Research and Therapy* in 1963 and *Behavior Therapy* in 1968, as well as a number of books on this new form of therapy.

The Birth and Early Development of Cognitive Therapy

Aaron T. Beck, an American psychiatrist who was initially trained in psychoanalysis, worked mainly with depression in the 1960s. He realized that psychoanalytic treatment was not very successful with depressed patients and started to collect clinical data on the way depressed patients characteristically think about themselves and the future. Based on these data he developed a cognitive theory of depression and a treatment that focused on changing negative thoughts and associated behaviours. His first book on depression was published in 1967 and his first on cognitive therapy in 1976. The first RCT on cognitive therapy in depression (Rush et al. 1977) showed that cognitive therapy was better than the antidepressant imipramine, a finding that aroused both interest and critique. The treatment manual of cognitive therapy for depression was published in 1979 and it has been used in numerous RCTs since then. Thus, the first diagnosis for which cognitive therapy was shown to work was depression.

Beck and others then turned their interest to anxiety disorders and a book on this theme was published by Beck, Emery and Greenberg in 1985. One of the European researchers, who after a behavioural training, became interested in cognitive therapy is the second author of this chapter, David Clark at Oxford University. After spending a semester of training at Beck's Institute of Cognitive Therapy in Philadelphia, Clark started to use cognitive therapy in his work with panic disorder patients and in 1986 he published a well-known article on the theoretical model of cognitive therapy in panic disorder. His first RCT on panic disorder was published in 1994, showing that cognitive therapy was more effective than imipramine and applied relaxation. Clark then turned his interest to social phobia, health anxiety and post-traumatic stress disorder (PTSD).

The third diagnosis for which cognitive therapy was applied is eating disorders, bulimia nervosa in particular. This work was initially carried out by the English psychiatrist Christopher Fairburn at Oxford University in the 1980s. In the early 1990s the English psychologists Nick Tarrier and Gillian Haddock at Manchester University and the psychiatrists David Kingdom and Douglas Turkington started to explore how cognitive therapy could be used with psychotic patients, something that American researchers in the area initially discouraged. However, the last 20 years of research in this field shows that it is possible to apply cognitive interventions for psychotic patients, sometimes with excellent results even if the mean effect sizes reported in meta-analyses are not that large.

CBT: The Combination of Two Therapies

There were probably a number of factors that together helped the combination of cognitive and behaviour therapy (CBT) gain acceptance. From a behaviour therapy perspective, the cognitive component in the emotional reaction had, since Peter Lang's articles and chapters in the 1960–70s, been considered as important as the behavioural and the physiological components. Development of treatment methods mainly focused on the behavioural (e.g. exposure

in vivo and social skills training) and physiological components (e.g. progressive relaxation and biofeedback). However, as early as the 1970s there were attempts to develop more cognitive techniques as illustrated in the books by Mahoney (1974) and Meichenbaum (1977). Thus, there were a number of behaviour therapists who greeted cognitive therapy with open arms, realizing that it brought them a number of new interventions that could be used in the treatment of their patients.

From the cognitive perspective, Beck realized in his work with depressed patients that the severely depressed could not be treated with purely cognitive interventions to start with. They needed behavioural interventions to get activated so that they responded to the cognitive therapy. Another factor often mentioned by Beck was that when he wanted to present his treatment at scientific congresses the only place he was welcomed was at the Association of the Advancement of Behavior Therapy, from 1973 onwards. Thus, even if not all cognitive therapists wanted the combination, they did not seem to have a problem with the term CBT.

Another factor that may have contributed to this marriage of two therapies is the history of world congresses in this field. The first World Congress in Behaviour Therapy was held in Jerusalem in 1980, followed by Washington, DC in 1983, Edinburgh in 1988 and the Gold Coast (near Brisbane) in 1992. Regarding cognitive therapy the first world congress was in Umeå, Sweden in 1986, then in Oxford, 1989 and Toronto, 1992. The two congresses in 1992 were held only two weeks in between and only a few people went to both. This situation was unsatisfactory and a group of people started to work on the idea of a joint congress, among them the Danish psychologist Irene Oestrich and the authors of this chapter. We managed to persuade influential people to endorse the idea of a joint congress with two scientific committees: the behavioural led by Lars-Göran Öst and the cognitive by David Clark. In 1995 the World Congress of Behavioral and Cognitive Therapies was held in Copenhagen as the first joined congress. This was a success and since then all the CBT world congresses have been joined (with only one scientific committee though) (Acapulco, 1998; Vancouver, 2001; Kobe, 2004, Barcelona, 2007; and Boston, 2010).

Characteristic Features of Cognitive Behaviour Therapy

CBT is a broad form of psychotherapy with the following factors as the most characteristic features:

1. It is based on *empirical* psychology, primarily learning and cognitive psychology. The theoretical basis for the various treatment methods is either classical and operant learning psychology or the cognitive theory developed for clinical work.
2. It views *psychopathological* behaviours as governed by the same laws as normal behaviour and considers that they can be acquired at any point in an individual's life; unlike psychoanalysis which assumes a specific phase model. As the behaviours are governed by learning principles, it is assumed that it was advantageous for the patient to behave this way at some time in the past.
3. It is in continuous *development* and *tests* theoretical and therapeutic statements in a scientific way. Already in the 1960s the early proponents of behaviour therapy argued for the necessity of subjecting our treatment methods to the strictest of scientific testing and that this form of therapy will never be completely developed, but continuously be modified as a consequence of new research.

4. It is based on a *cognitive-behavioural model* of emotions. The model is described later in this chapter.
5. It includes general and disorder specific *treatment methods*. There are some treatment methods that are general and can be used across a number of different disorders (e.g. exposure *in vivo* for anxiety disorders) and some that are specific for one particular disorder (e.g. applied tension for blood phobia).
6. The treatments are structured and *action oriented*, i.e. aiming to change the patient's problems. Contrary to traditional (generic) psychodynamic therapy, all CBT methods are clearly structured into various components and they aim to achieve observable change in the patient's problems. Insight into a problem is not enough. There also needs to be a change in problematic behaviour (clinically significant improvement; Jacobson and Truax 1991).
7. The treatments have *concrete goals* on both the behavioural and experiential level. The therapy goals are concrete, for example, for an agoraphobic patient to be able to keep up a job outside the home and interpret somatic sensations as just that and not as an indication of an impending physical catastrophe.
8. These goals are derived from diagnosis-specific *maintenance models* and individual *case conceptualizations* (behaviour analyses). At least for the most common psychiatric disorders there are published CBT models concerning the factors that empirically have been shown to maintain the disorder (e.g. Clark 1986 on panic disorder, Salkovskis 1985 on OCD, Ehlers and Clark 2000 on PTSD). Together with the individual case conceptualizations these are used to derive the treatment goals.
9. Cognitive and behavioural interventions are *integrated* in most treatments. In some disorders the well-established treatment is purely behavioural, e.g. early behavioural intervention in infantile autism or token economy in hospitalized schizophrenia, but in most instances there is an integration of cognitive and behavioural methods.
10. The treatments are focused on the eliciting and *maintaining factors* for the problems of the individual patient. Instead of trying to reveal the onset of the patient's psychiatric problems, which often is a fruitless endeavour, the focus is on the only thing that can be changed, i.e. the factors currently maintaining the problems.
11. The therapist and patient continuously work as a *team* in order to achieve the goals. For both the patient and the therapist a cognitive behavioural treatment can be difficult and hard work for both parties. The patient is an expert on his/her thoughts, feelings and behaviours, whereas the therapist is an expert on the therapy. When they join forces they will be a strong team that can work effectively with the patient's problems.
12. The treatments are completely *transparent*. The patient is all the time aware of what is going on and why different things are being done. In order for the therapist and patient to work as a team to combat the patient's problems there must be no hidden agenda on the part of the therapist. Everything is 'out on the table' and the patients are encouraged to ask questions about anything they do not understand about the goal and methods of the treatment.
13. The treatments help the patients to *help themselves*. The ultimate goal is to 'get rid of the therapist', i.e. the patients should learn enough through therapy to be able to do the treatment on their own without constant help from the therapist.
14. The treatments are *not limited* to the therapist's office but can often take place in the natural situations where the patients' problem behaviours occur. Already in the 1960s the early behaviour therapists argued that the best place to carry out the treatment was

in natural situations where the problems occurred. Seeing the patient for one hour, once a week is a model that CBT, uncritically, has borrowed from short-term psychodynamic therapy and it should be discouraged. By accompanying the patient into natural situations the therapist can observe the problem behaviours with his/her own eyes and does not have to rely on the patient's descriptions, which often are adjusted to what one believes the therapist wants to hear.

15. *Homework assignments* are an important part of the treatment in order for the patients to experience progress in natural situations. The extent to which patients carry out the homework assignments agreed upon with the therapist is a fairly strong predictor of outcome, which has been shown in empirical research time and time again (Kazantzis et al. 2010). It would be hard to imagine the good treatment effects often achieved in a brief treatment time without the patient carrying out homework assignments in between therapy sessions.

Myths and Misconceptions about CBT

In addition to the above description of characteristic features of CBT, it may be enlightening to discuss some of the myths or misconceptions that exist about CBT as a form of psychotherapy.

CBT leads to symptom substitution

This is a myth. Psychoanalytical theorists assumed that problematic behaviours are based on unconscious conflicts and tend to predict that if a therapy failed to focus on such conflicts, any relief would be temporary with new symptoms emerging to take the place of those that had been 'superficially' treated. This is a very vague theory that does not specify what symptom will occur and when this will happen, making it essentially impossible to disconfirm. Nevertheless, after more than 40 years of CBT research we can be fairly confident that symptom substitution does not happen. If a successfully treated patient has a relapse the original problems generally reappear, not a new one.

CBT ignores the causes of patients' problems

CBT tends to focus on the 'here and now', particularly the factors that are involved in maintaining a problem. This is efficient, not least because the original cause may no longer be evident. However, some CBT techniques, such as rescripting of early traumatic memories, do focus on the more distant past and have a valuable place in a generally present-focused treatment.

The therapeutic relationship is unimportant in CBT

This myth is complete nonsense. A good therapeutic relationship is necessary, but not sufficient, in order to achieve the treatment goals. Imagine, for example, carrying out the one-session treatment described in Chapter 9 without having a strong therapeutic relationship – a team work where both participants have a mutual trust in each other. This relationship functions as a foundation on which you can build with the effective treatment methods that have been developed. Of course, clients differ considerably in the way they behave in therapy sessions. Part of this variability is due to the nature of their disorder. For example, patients with social

anxiety disorder can become very self-conscious if they feel excessively scrutinized or observed. Part of the ability of a CBT therapist to develop a good therapeutic relationship includes sensitivity to those issues and flexibility in responding.

Experiencing strong emotions during exposure treatment is dangerous

There is no empirical support for this particular myth. Strong anxiety reactions like panic attacks are extremely uncomfortable but they are not dangerous to the patient. There is no scientifically reliable source indicating that it is possible to die of a panic attack. In the hands of a skilful therapist, a patient can learn a great deal from the experience of strong emotion during treatment.

The patient's thoughts and feelings are ignored in CBT

The opposite is true when we look at the focus of cognitive therapy. In general, thoughts and feelings are very important as maintaining factors once a psychiatric disorder has been established. That is why these factors are focused on both the case conceptualization and the treatment of the patients.

CBT assumes that psychiatric disorders have developed through simple learning processes

CBT models assume that psychiatric disorders are caused by a variety of factors and generally have multifaceted aetiologies. However, we have to acknowledge that with very few exceptions the aetiology of psychiatric disorders is still not known. One reason for this is that it is ethically impossible to carry out experiments in which normal persons (often at a young age) are subjected to factors that might lead to a psychiatric disorder. Despite this uncertainty, most common psychiatric disorders can be effectively treated by CBT methods.

The use of medications is incompatible with CBT interventions

This is also not correct. However, with a few exceptions, the combination of psychotropic drugs and CBT does not yield a better outcome than CBT alone. There is also a price to pay for the combination: it is more expensive; the dropout from treatment is usually higher than for CBT alone; and patients may ascribe the effects they obtain to the drug only, which makes them less inclined to stop taking the drug.

Only the most intelligent patients do well with CBT

Research has shown that the patients' IQ is not correlated with the outcome of treatment. Also, there are specific behavioural (operant) methods developed for the treatment of people with severe mental retardation.

CBT is only about thinking positively

This is also a myth. The patient acquires new knowledge about the thoughts and beliefs that maintain their problems. They learn to replace irrational catastrophic beliefs with realistic thoughts that better accord with reality.

CBT is easy to carry out

Sadly, this is not always the case. CBT may seem like an easy treatment but it is really hard to do in a competent way. That is why treatment manuals are developed for the training of therapist and a basis for the competence ratings that supervisors do on a continuous basis to evaluate their supervisees.

Important CBT Principles

Figure 7.1 describes a cognitive behavioural model of emotional responses. Various stimuli (e.g. events, situations, thoughts, images) lead to an interpretation (gives meaning to) of the stimuli the individual has experienced. The interpretation is influenced by the learned assumptions that the subject brings with him/her from his/her history. The interpretation in turn leads to an emotion (e.g. fear) and a behavioural reaction (e.g. escape).

Basic assumptions

The cognitive-behavioural theory of emotional disorders posits that individuals develop a series of general beliefs (assumptions) about their world and themselves which make them prone to interpret specific situations in an excessively negative and dysfunctional fashion. For example, an assumption such as ‘unless I am liked by everyone, I am worthless’, might make an individual particularly likely to interpret silent spells in a conversation as an indication that others think he/she is boring. We all develop assumptions based on our prior experiences and they help us make sense of the world. However, these become problematic if they consistently trigger excessively negative interpretations and/or are too rigid, extreme or inflexible.

Negative automatic thoughts in anxiety disorders

The term ‘negative automatic thoughts’ refers to the particular thoughts (cognitions) that an individual experiences when he or she is anxious in an anxiety-provoking situation. Different anxiety disorders are characterized by different thoughts. So, the thoughts (cognitions) of specific phobics focus on harm that might occur in an identifiable situation. Social phobics’ thoughts concern exaggerated fears of being evaluated, or having one’s weaknesses exposed and being judged adversely by others. Panic disorder patients’ thoughts focus on immediate physical or neural catastrophe (heart attack, death, going mad) indicated by physical sensations. Obsessive-compulsives’ thoughts are about excessive responsibility for harm to oneself or others. Generalized anxiety patients’ thoughts concern overestimation of threat, intolerance

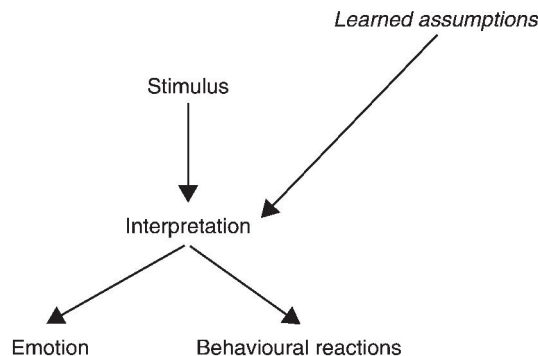


Figure 7.1 A cognitive-behavioural model of emotional responses

of uncertainty and worry about worrying. PTSD patients' thoughts concern ongoing threats linked to a past traumatic event. These cognitions, or variations thereof, should be arrived at during the initial cognitive-behaviour analysis phase (case conceptualization) in order for the treatment to be focused on the maintaining factors.

Treatment Principles in CBT for Emotional Disorders

The treatments usually entail one or a combination of the following principles:

1. Correction of contra-productive convictions or interpretations.
2. Learning and testing of alternative ways of interpreting one's experiences.
3. Helping the patient to change how he/she behaves in the situation.
4. Learning to accept and test out new ways of understanding oneself, one's experiences and the assumptions about the future.

Challenging beliefs

One important treatment principle in CBT is helping the patient to challenge his/her beliefs. This can be done through discussion and through behavioural experiments in which the patient lets go of any safety behaviours and discovers whether their predictions are correct or excessively negative.

Discussion often involves asking patients a series of questions that help them put their negative thoughts and beliefs in perspective. For example:

- What evidence do I have for this belief?
- What evidence do I have against this belief?
- Is there another explanation?
- What is the worst thing that could happen in this situation?
- How terrible would it be if that happens?
- What is the best thing that could happen in this situation?
- What is the most probable event to happen in the situation?
- What effect does it have on me to hold this belief?
- How would I react if another person was in the same situation?

Safety behaviours

A safety behaviour is a behaviour actively carried out by the person in order to try to prevent a feared catastrophe. Thus, it is something the patient does, e.g. resting when experiencing an increase in heart rate and not just passively escaping anxiety-arousing situations or avoiding them altogether as in agoraphobia.

The safety behaviours have a variety of adverse effects. They prevent disconfirmation of an incorrect belief; they can increase anxiety-related symptoms; and they may increase self-focused attention, thoughtfulness and rumination. The safety behaviour is connected to the specific focus of the threat via the internal logic used by the patient.

Analysis of safety behaviours

When the therapist and patient together analyse the safety behaviour the following questions are useful:

- When you are afraid x (specify catastrophe) may happen, is there anything you do to try to prevent it (or to minimize its effects)?
- What is the worst that could happen if you did not do this behaviour?
- How convinced (0–100 per cent) are you that if you had not carried out your safety behaviour the things that you fear would have occurred?

Behavioural experiments

Behavioural experiments in emotional disorders can be classified into four different categories depending on their goal.

1. Experiments that help patients understand the cause of specific symptoms or problems (e.g. hyperventilation for panic disorder patients).
2. Experiments that help the patient to understand how the things they do to cope with the situation may make it worse (e.g. suppressing thoughts).
3. Experiments that demonstrate the importance of the way one thinks (e.g. word pair associations).
4. Experiments that help patients to discover that the things they fear actually do not occur (e.g. exposure exercises, particularly if accompanied by dropping safety behaviours).

Behavioural experiments are undertaken during ordinary therapy sessions, both in the therapist's office and in the real world. They are also often set as homework assignments between sessions.

Another important treatment procedure applicable to many psychiatric disorders is exposure *in vivo*. The aim of this is to teach the patients that if they remain in the anxiety-arousing situation the behavioural and physiological reactions as well as subjective fear will gradually dissipate. As a consequence of this their catastrophic beliefs will also change and be replaced with realistic evaluations, providing that the exposure has focused on the patients' core cognitions, directly or indirectly.

The Evidence Base of CBT

Unless a therapy has been shown to be effective in the treatment of psychiatric disorders it does not matter how good a theoretical background or logical treatment methods it has. The first major attempt to describe 'empirically validated treatments' was carried out by the American Psychological Association's Division 12 special *Task Force in Promotion and Dissemination of Psychological Procedures* in 1995. The committee consisted of various people representing different forms of psychotherapy and was led by a CBT researcher Dianne Chambless. The report attracted a lot of interest, as well as criticism, and in a later article by Kendall and Chambless (1998) they used the term 'empirically supported treatments' (EST),

which has been used from then on. In England the term ‘evidence-based medicine’ was used by Sackett et al. (1996) at the same time and today EST and evidence-based psychotherapy are usually used as synonyms.

Criteria for EST

The criteria set out by the original APA Task Force have, with some modifications, been used since the mid-1990s. The empirical evidence for a specific treatment is classified into four degrees in descending order: (1) Well-established; (2) Probably efficacious; (3) Possibly efficacious; and (4) Experimental (Silverman and Hinshaw 2008).

Well-established

In order for a treatment to be classified as well-established there must be at least two methodologically rigorous group design studies, done in two independent research settings and carried out by two independent research teams showing that the treatment is statistically significantly better than pill or psychological placebo, or another active treatment, *or* equivalent to an already established treatment for the disorder in question and where the study has enough statistical power to detect moderate differences. Furthermore, treatment manuals or the equivalent were used, the study was carried out on a population with a specific problem and inclusion and exclusion criteria had been specified. Reliable and valid outcome measures were used and adequate data analyses were applied.

Probably efficacious

There must be at least two RCTs showing that the treatment is statistically significantly better than a waitlist control group, or one or two RCTs fulfilling the criteria for well-established with the exception of being carried out by two independent research teams.

Possibly efficacious

At least one methodologically rigorous RCT shows that the treatment is effective and there is no counter evidence.

Experimental treatments

The treatment has not yet been tested in RCTs fulfilling the criteria for good research methodology.

Which CBT Treatments are effective for which Disorders?

Tables 7.1–7.3 include lists of the CBT treatments that have some degree of evidence base for which psychiatric disorders according to age groups. This compilation has been done by the first author on a continuous basis since 1995 by summarizing articles and books written by non-CBT researchers or groups comprising representatives of different forms of psychotherapy. The reason for using this procedure is to avoid the possible bias that could emerge from CBT researchers evaluating CBT research themselves.

Adults

Since the same treatment method, e.g. exposure *in vivo*, can be used in most anxiety disorders, it is less informative to count the number of individual treatment methods. Instead we have chosen to look at the number of combinations between diagnosis and treatment method. In anxiety disorders there are 14 combinations of diagnosis and treatment methods considered as well-established and four that are judged as probably efficacious. In major depression there are two well-established and two probably efficacious, in bipolar disorder two probably efficacious and for schizophrenia three well-established and one probably efficacious.

Turning to the addictions Table 7.1 indicates that alcohol abuse and dependence has attracted a lot of research interest with fully seven well-established treatments. In opiate dependence there are two probably efficacious methods, in cocaine dependence two well-established and two probably efficacious and in nicotine dependence one well-established and two probably efficacious.

In impulse control disorders there are only two probably efficacious treatments, one each for pathological gambling and one for trichotillomania.

In eating disorders we have a peculiar situation. Anorexia nervosa has been written about in the medical literature at least since the eighteenth century and it was included in the first edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-I) in 1952, but relatively few RCTs have been carried out. Bulimia nervosa, on the other hand, was not included in the DSM until 1980, with the publication of DSM-III, but there are many more times the RCTs than the number for anorexia nervosa. In the latter category there are only two probably efficacious treatments, whereas in the former there is one well-established. Binge eating disorder has one probably efficacious treatment and obesity one well-established and one probably efficacious.

In the sexual dysfunctions there are two well-established treatments (for impotence and vaginismus, respectively) and four probably efficacious. For sexual deviations there is one probably efficacious treatment. For sleep disorders there is one well-established and one probably efficacious treatment and for tics one well-established. Finally, coming to personality disorders there is one well-established treatment for borderline personality disorder and two probably efficacious ones for avoidant personality disorder.

In total there are 36 diagnosis–treatment combinations having such a strong research base that the treatment is considered well-established and 28 that it is probably efficacious.

Geriatric patients

As is evident from Table 7.2 the research on geriatric patients is clearly neglected compared to that on adults but also on children. There are only two well-established treatments, both on depression, whereas the treatments for anxiety disorders (two) and sleep disorders (one) are probably efficacious. Regarding dementia the treatments are experimental at this stage.

Children and adolescents

Table 7.3 shows that for the anxiety disorders there is at least one well-established treatment for each of the diagnoses (six in total). In addition there are four probably efficacious treatments for specific phobias and one for social phobia. In major depression there are two well-established

Table 7.1 Evidence-based CBT methods for adults.**Anxiety disorders***Specific phobias*

Exposure *in vivo* (1), Applied tension for blood phobia (1) and Systematic desensitization (2)

Social phobia

Exposure *in vivo* (1), Cognitive behaviour therapy in groups (1), Cognitive therapy individually (1) and Systematic desensitization (2).

Agoraphobia with panic disorder

Exposure *in vivo* (1) and Cognitive behaviour therapy (1).

Panic disorder without agoraphobia

Panic control training (1), Cognitive therapy (1) and Applied relaxation (1–2).

Generalized anxiety disorder

Cognitive behaviour therapy (1) and Applied relaxation (1)

Obsessive-compulsive disorder

Exposure and response prevention (ERP) (1) and Cognitive therapy + ERP (2)

Post-traumatic stress disorder

Cognitive therapy (1) and Prolonged exposure in imagination (1)

Major depression

Cognitive behaviour therapy (1), Behaviour therapy (1), Behavioural activation (2) and Social problem solving (2)

Bipolar disorder

Cognitive behaviour therapy (1) and Behavioural family therapy (2)

Schizophrenia

Token economy programme (1), Behavioural family therapy (1), Cognitive therapy for delusions and/or hallucinations (1) and Social skills training (1–2)

Alcohol abuse and dependence

Community reinforcement approach (1), Motivational interviewing (1), Social skills training (1), Relapse prevention (1), Signal exposure (1), Coping skills training (1) and Contingency management (1)

Opiate dependence

Behaviour therapy (operant methods) (2) and Cognitive therapy (2)

Cocaine dependence

Behaviour therapy (1), Community reinforcement approach (1), Cognitive behaviour therapy with relapse prevention (2) and Behavioural marital therapy (2)

Nicotine dependence

Multi-component cognitive behaviour therapy (1), Cognitive behaviour therapy in groups (2) and Scheduled reduced smoking (2)

Impulse control disorders*Pathological gambling*

Cognitive behaviour therapy (2)

Trichotillomania

Habit reversal training (2)

Eating disorders*Anorexia nervosa*

Behaviour therapy (operant methods to increase weight) (2) and Cognitive behaviour therapy (2)

(continued)

Table 7.1 (cont'd).*Bulimia nervosa*

Cognitive behaviour therapy (1)

Binge eating

Cognitive behaviour therapy (2)

Obesity

Behaviour therapy (1) and Cognitive behaviour therapy (2)

Sexual dysfunctions*Male erectile disorder*

Behaviour therapy/Cognitive behaviour therapy to reduce anxiety (1)

Premature ejaculation

Behaviour therapy (2)

Female sexual arousal disorder

Combined sexual and marital therapy (2)

Vaginismus

Exposure based behaviour therapy (1)

Female orgasmic disorder

Behavioural marital and sexual therapy (2) and Sexual skills training (2)

Sexual deviations

Behaviour therapy (2)

Sleep disorders

Stimulus control (1) and Progressive relaxation (1–2)

Tics and Tourette's syndrome

Habit reversal training (1)

Personality disorders*Borderline personality disorder*

Dialectic behaviour therapy (1)

*Avoidant personality disorder*Social skills training (2) and Exposure *in vivo* (2)

Notes: (1) Well-established; (2) Probably efficacious; (3) Possibly efficacious; and (4) Experimental.

Table 7.2 Evidence-based CBT methods for geriatric patients.**Anxiety disorders**

Cognitive behaviour therapy (2) and Progressive relaxation (2)

Major depression

Behaviour therapy (1), Cognitive behaviour therapy (1) and Problem-solving therapy (2)

Sleep disorders

Stimulus control (2)

Dementias

Memory and cognitive training (3–4)

Notes: (1) Well-established; (2) Probably efficacious; (3) Possibly efficacious; and (4) Experimental.

Table 7.3 Evidence-based CBT methods for children.**Anxiety disorders***Specific phobias*

Exposure *in vivo* (1), Participant modelling (1), Filmed modelling (2), Reinforced practice (2), Systematic desensitization (2), *In vivo* desensitization (2)

Social phobia

Social effectiveness training (1) and Cognitive behaviour therapy in groups (2)

Obsessive compulsive disorder

Exposure and response prevention (1)

Generalized anxiety disorder, separation anxiety disorder, social phobia

Cognitive behaviour therapy individually or in groups (1)

Post-traumatic stress disorders

Trauma-focused cognitive behaviour therapy (1)

Major depression in children

Cognitive behaviour therapy in groups (1), Cognitive behaviour therapy in groups for children and their parents (1) and Behaviour therapy (2)

Major depression in adolescents

Cognitive behaviour therapy in groups (1), Cognitive behaviour therapy in groups + parent training (2), Cognitive behaviour therapy individually (2) and Cognitive behaviour therapy individually + parent component (2)

Conduct disorder and oppositional defiant disorder

Parent training the Oregon model (1), Parent training with video modelling (2), Problem-solving skills training (2), Multidimensional Treatment Foster Care Model (2), Anger control training (2), Helping the Noncompliant Child (2), Parent-child interaction training (2), Positive Parenting Program (2), Assertiveness training in groups (2)

Attention deficit hyperactivity disorder

Behaviour therapy parent training (1), Behavioural contingency management in classrooms (1), Behavioural intervention in friends' groups (1)

Drug abuse in adolescents

Cognitive behaviour therapy individually or in groups (1) and Behavioural family therapy (2)

Autism

Early behavioural intervention (1)

Tics and Tourette's syndrome

Habit reversal training (1) and Exposure plus response prevention (2)

Eating disorders*Anorexia nervosa*

Behaviour therapy (operant methodology to increase weight) (1)

Bulimia nervosa

Cognitive behaviour therapy-guided self-help (3)

Obesity

Behaviour therapy (2)

Enuresis

Behaviour therapy (1)

Encopresis

Behaviour therapy (1)

Notes: (1) Well-established; (2) Probably efficacious; (3) Possibly efficacious; and (4) Experimental.

treatments for children and one for adolescents and in addition one probably efficacious for children and three for adolescents.

Conduct disorder and oppositional defiant disorder are the diagnoses with most RCTs of psychological treatments by far, which is evident from Table 7.3 showing one well-established and eight probably efficacious treatments. In ADHD there are three well-established treatments, in autism one and in tics one together with one probably efficacious.

Regarding eating disorders in youth the research situation is even worse than that for adults; there is one well-established treatment for anorexia nervosa, one probably efficacious for obesity and one possibly efficacious for bulimia nervosa. Finally, in both enuresis and encopresis there is at least one well-established treatment.

In total there are 16 diagnosis–treatment combinations having enough of an evidence base to be regarded as well-established and 20 that are probably efficacious.

If we summarize across the three age groups there are 54 diagnosis–treatment combinations that are well-established and 51 that are probably efficacious. However, if researchers who are independent of the originators of specific treatments were to carry out RCTs on these treatments it is most probable that a large portion of the 51 treatments that now are probably efficacious will earn the classification of well-established.

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Multimodal Cognitive Behavioural Treatment

Jesper Lundgren and Ulla Wide Boman

Historical Background

The chapter will describe the multimodal psychological treatment jointly developed over three decades by the Public Dental Service, Department of Psychology and the Institute of Odontology at the University of Gothenburg. The Clinic of Oral Diagnosis at the Dental School in Gothenburg was founded in 1968. One group of patients that was referred to the clinic included those that due to their dental fear could not manage conventional treatment and therefore requested treatment under general anaesthesia. However, it became clear fairly soon that the available resources for treatment of fearful dental patients with avoidant behaviour were not sufficient. In addition, the patients that were treated under general anaesthesia often received a more radical treatment where teeth were extracted than they would have through conventional treatment. Further, many patients came back with a new referral after a few years, with new treatment needs but with the same level of dental fear.

The First Treatment Method

In the early 1970s the head of the Clinic of Oral Diagnosis, Alf Öhman, contacted the Department of Psychology at Gothenburg University with a request for help with the treatment of patients' dental fear. The focus shifted from primarily treating teeth in the fearful patient to treatment of fear in the dental patient. An assistant psychologist, Olav Bjercke, was assigned to work with dental phobics at the dental clinic. The treatment used was systematic desensitization according to the South African psychiatrist Joseph Wolpe's method (Wolpe 1954, 1958). The patient was initially trained in progressive relaxation according to Jacobson (1970) and then when relaxation was achieved, a hierarchy of anxiety-triggering situations or objects was formed. Desensitization was established when the patient, in the relaxed state, envisioned each of the situations, from the

'easiest' to the most anxiety provoking. Each step in the anxiety hierarchy was repeated until relaxation replaced the anxiety reaction. The treatment was performed in a rest room at the dental clinic. The initial evaluation of the method is described in Bjercke and Plantén (1974).

The first progress of the psychological treatment was to move it into a room that was equipped as a dental treatment room, which facilitated exposure *in vivo*. At the same time the context was more consistent with the phobic situation, which was considered preferable in terms of generalization of desensitization. Although the early treatment results were encouraging, it was found that some patients had difficulty visualizing situations in the anxiety hierarchies. As a consequence, a variety of dental situations were recorded on video and exposure to the phobic situation could then be performed *in vitro*, via a monitor. The patient gave a sign to the therapist when anxiety and corresponding tension elevated and then exposure was stopped and the therapist gave a brief relaxation instruction before the video scene was repeated. To further enhance the exposure and make the scenes more realistic, the corresponding exposure scenes were also recorded in 'first person', with the camera in the position of the patient's eyes.

However, after working with these scenes for some time it was noted that patients often did not signal the therapist when anxiety was elevated and thus exposure continued, despite arousal. Some patients stated that they did not comply with the instruction to signal, due to reluctance to bother the therapist. Since exposure during tension was inconsistent with the rationale of systematic desensitization, a remote control was introduced, which gave the patient the ability to stop exposure, without having to act through the therapist. It was assumed that this would lower the threshold for the patient. In this way, the procedure for exposure was automated to a large extent. When the patient discontinued the exposure, a short instruction to relax was automatically given, which in turn was followed by a repetition of the recently stopped scene. During the course of treatment, the patient was sometimes left to carry out the systematic desensitization on his/her own, during periods of 15–30 minutes.

Sven G. Carlsson, who had been Olaf Bjercke's supervisor during the process of therapy development, succeeded Bjercke as clinical psychologist in 1976. Carlsson had previously treated dental patients suffering from temporomandibular disorder (TMD) with biofeedback training of the facial muscles. This technique was now combined with other parts of phobia treatment to not only insure that the patient was relaxed during exposure, but also as a pedagogical tool to teach relaxation (Carlsson, Linde and Öhman 1980). Furthermore, it was later discovered that for some patients, the use of biofeedback helped them to attribute the fear to something observable and controllable. Progressive relaxation in combination with EMG biofeedback was used successfully in other places at this time as a means for reduction of fear and muscle tension (Miller, Murphy and Miller 1978). Subsequent evaluations of psycho-physiological activation of dental phobic patients showed that the initial idea of a straightforward relationship between autonomic response and dental fear was simplistic (Carlsson et al. 1986). However, it was shown that positive changes in mood, combined with the gradual reduction of heart rate during therapy, predicted a good treatment effect (Harrison, Carlsson and Berggren 1985).

The Revised Treatment

The behavioural treatment, which in the 1970s had a focus on technology, broadened in the 1980s and the importance of a good relationship between therapist and patient was highlighted in parallel with a greater interest in the patient's perceptions of self and the

dental situation. Berggren and Carlsson (1984) showed that the dental fear treatment, which was now referred to as 'a psycho-physiological treatment', was effective and that 88 per cent of the patients who had undergone treatment could be treated by general dental practitioners. Besides these quantitative results, Berggren and Carlsson (1984) made four qualitative observations:

'(1) Patients appeared to profit from an integrated therapy approach, where the psycho-physiological training was an obvious part of treatment. (2) The real-life experiences of treatment at the special clinic were important parts of the therapy. The patients almost invariably were very reluctant to initiate dental treatment and became amazed when they experienced how relaxed they were and how well they came through. (3) Patient responses to biofeedback training indicated that factors other than improvement in relaxation were in operation. The patients became aware of their tension and began to use the concept of tension in conceiving of their reactions to dentistry. Some were able to indicate this meant an orientation away from the irrational and negative picture they previously had of their problems with dentistry. (4) By continuously observing the tension level displayed by the biofeedback apparatus both patients and therapist received useful information about therapeutic change. Most patients indicated that the observation of decreases in tension while they repeated a scene had beneficial effects upon motivation and perceived competence' (Berggren and Carlsson 1984: 491).

Berggren and Carlsson (1984) also made a post hoc analysis of the treatment process and concluded that treatment success is not accompanied by increased relaxation in all patients, in contrast to what was postulated by Wolpe (1954). They also discussed the reduction of fear in patients in terms of a cognitive reattribution of dental care, in accordance with Albert Ellis's cognitive theories (Ellis 1962). Furthermore, Lazarus's theories of appraisal and coping (Lazarus 1966) were used to understand the dental phobic patient's sense of hopelessness before treatment and how exposure gradually led to an increased sense of competence. In other words, it is clear that cognitive factors were becoming an important part of the description of this behavioural therapy.

Following his doctorate in 1984, Ulf Berggren, together with his former mentor, Sven Carlsson, composed the hub of a clinically and scientifically successful cooperation that has lasted for over 25 years. Some studies have compared the relative effectiveness of behavioural and cognitive interventions (Berggren, Hakeberg and Carlsson 2000; Lundgren, Carlsson and Berggren 2006). Berggren and Linde (1984) showed that the clinic-based behavioural therapy (BT) is both more cost efficient and provides better treatment results than dental treatment under general anaesthesia, which was the option previously offered to dental phobic patients. Follow-up studies after 2 and 10 years respectively, showed that psychological treatment resulted in lower dental anxiety and higher dental attendance compared to a control treatment (general anaesthesia) (Berggren and Carlsson 1986; Hakeberg et al. 1993). Another essential result is that treatment of dental fear and deteriorated oral health gives significant positive side effects, such as less use of alcohol and reduced sick leave (Berggren and Carlsson 1986; Hakeberg et al. 1993). These results represent an important background to the fact that since 1999 the Swedish dental insurance has subsidized the treatment of dental phobia in those cases where it is carried out in collaboration between experienced dentists and psychologists (or the equivalent), in full accordance with 'the Gothenburg model'. The treatment has also proved effective in comparison with other published treatments of dental phobia (Kvale, Berggren and Milgrom 2004).

The Current Treatment

Today, the dental phobia treatment is part of the Dental Fear Research and Treatment Clinic (DFRTC), a specialist unit associated with the Clinic of Oral Medicine in Gothenburg. The unit has three dentists, three dental nurses, one dental hygienist and two psychologists. At the DFRTC, patients are cared for following two different lines described in a manual (Wide Boman and Bernson 2012): dental phobia treatment integrated with dental treatment; or adapted dental treatment. Dental phobia treatment has the form of cognitive behaviour therapy (CBT) and is delivered by a psychologist at the clinic. The goal of the dental phobia treatment is to treat the patient's dental anxiety and then refer the patient for conventional dental care outside the DFRTC. About half of the patients are appropriate for and motivated by phobia treatment and this is the treatment described in this chapter. The treatment model and structure is based on evaluations and research, as described earlier in this chapter. Besides being a necessary part of evidence-based treatment, a clear structure facilitates working in team (psychologists and dental staff) and also when treating patients with high levels of anxiety. In Sweden, the National Health Insurance covers treatment of extreme dental anxiety among adults, as regulated by strict criteria concerning the patient, the professionals delivering treatment and also the maximum number of treatment sessions (Hägglin and Wide Boman 2012). To qualify for dental phobia treatment, patients must have avoided dental care for several years, except for brief acute treatment, in spite of a significant need for dental care and also suffer from severe dental fear, according to assessments made by a dentist as well as a psychologist, psychiatrist or psychotherapist. The treatment must be delivered by dentists and/or dental hygienists with well-documented treatment experience of patients with extreme dental fear and be carried out in close cooperation with a psychologist, psychiatrist or psychotherapist. The primary goal of the treatment must be to cure the dental phobia (Hägglin and Wide Boman 2012).

Approximately 200 new patients with severe dental anxiety attend the clinic every year; half of them referred from dentists or physicians, half of them through self-referral. In a recent study from the DFRTC it was found that the mean age of patients was 36 years (SD 9.9, range 21–69 years) and 61 per cent were women (Wide Boman et al. 2010). The patients reported high levels of dental anxiety (Dental Anxiety Scale (DAS) mean score 17.2; Dental Fear Survey (DFS) mean score 79.8) and a high degree of dental care avoidance behaviour with a median of seven years since the last dental treatment. One-third reported never attending dental care, 55 per cent reported irregular dental care, whereas 13 per cent reported more regular dental care, although without being able to complete treatment (Wide Boman et al. 2010). Many of the patients attending the clinic have a deteriorated dental health (Hakeberg, Berggren and Gröndahl 1993; Wide Boman et al. 2010). According to a previous study, most patients attribute their dental anxiety to previous negative experiences of dental treatment and a majority report being dentally anxious since a young age (Berggren and Meynert 1984). The same study also reported an overrepresentation of psychiatric and social problems in the patient group.

The start

The treatment process starts with a letter being sent to the patient who is asked to call the unit to book a time for a first visit. The letter states that at this first visit no dental examination will be performed unless the patient wants to. During the examination phase the patient meets the dentist twice, for an anamnestic interview including psychometric questionnaires, a dental

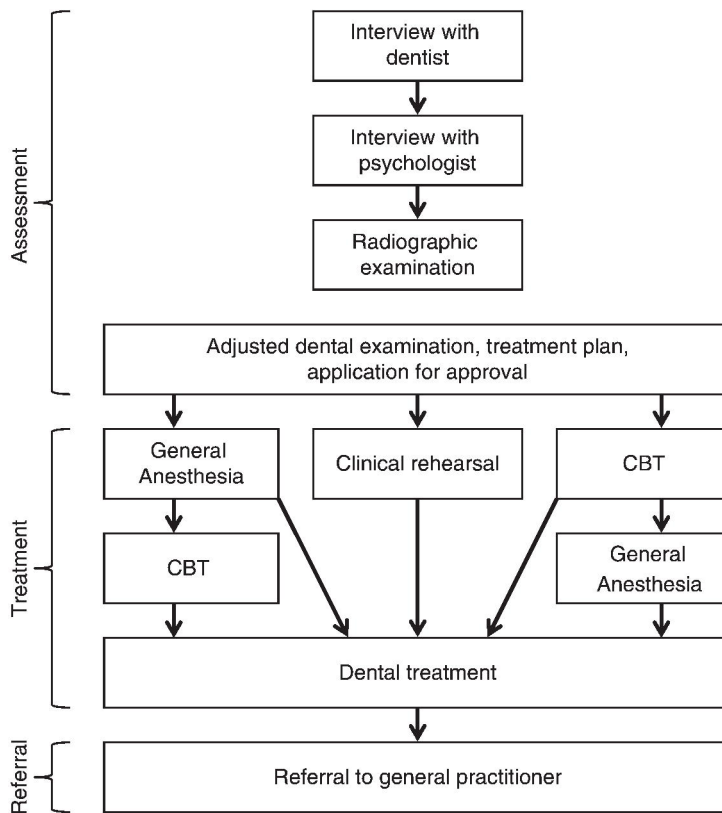


Figure 8.1 Treatment flow

radiographic examination, and, if possible, an adapted clinical examination. The questionnaires cover dental care history and treatment motivation, dental anxiety and also include screening for general anxiety and depression. Except for patients with substance abuse or severe psychiatric disorder, who are not considered suitable for phobia treatment, the dentist tries to motivate the patients to consider phobia treatment and offers one initial meeting with a psychologist at the clinic. This is a regular part of the treatment programme. For patients not suitable for or not at all interested in phobia treatment, dental treatment is planned with use of sedation/general anaesthesia if indicated. See Figure 8.1 for a flowchart of treatment phases.

The psychologist further investigates the patient's dental anxiety and general psychological and social health and discusses treatment options using motivational interviewing techniques (Miller and Rollnick 2002). The psychologist also assesses whether the patient fulfils the criteria to receive phobia treatment within the national insurance system. A treatment plan including both the patient's need of oral treatment and the dental anxiety treatment is formulated jointly by the dentist and the psychologist and discussed with the patient. For each patient an application for approval is sent to the County Council's Board for Oral Health.

Most patients undergo their phobia treatment starting with five to seven sessions with the psychologist at the clinic in a fully equipped dental treatment room, described in more detail below. Main interventions are graded exposure, relaxation, cognitive restructuring, applied

tension and self-assertiveness techniques. During this phase the patient typically does not receive dental treatment, unless acute dental problems emerge.

A few patients get all their phobia treatment by the dentist, with guidance from the psychologist. This is usually due to the fact that the patient expresses a preference for starting training with the dentist. Should this treatment turn out to be too anxiety provoking, the patient may shift therapist to the psychologist.

If the patient has an acute need for dental treatment or suffers from a severely deteriorated oral status, treatment with sedation or general anaesthetic can be given before phobia treatment. However, some oral treatment need is saved for later confirmatory dental treatment. It is necessary to also consider the risk that new treatments could activate traumatic experiences in these patients. Our clinical experience is that patients suffering from severe pain and oral malfunction due to a deteriorated oral status usually cannot manage to engage in phobia treatment unless they first get dental treatment reducing their worst symptoms. Also, patients with a deteriorated oral status may consider it hopeless facing such a large amount of sessions of dental treatment before getting a fairly good oral status and for these patients a first dental treatment under sedation may be indicated. Obviously, there is a risk that the patient, after an initial treatment, does not continue with a phobia treatment, thus following an avoidance behaviour pattern. This risk is discussed in an empathic manner with the patient. The fact that the dental treatment is not completed during an initial treatment also helps to motivate the patient to undergo phobia treatment.

Psychological treatment components

The part of phobia treatment delivered by the psychologists is based on the theory and techniques of CBT (O'Donohue, Fisher and Hayes 2003); and the psychologists have formal training in CBT. Treatment sessions are given in a fully equipped dental treatment room at the clinic. A broad-based package of interventions is described in the manual. The interventions are adapted to each patient following a behavioural functional analysis. Phobia treatment is potentially very anxiety provoking and demanding for the patient. Therefore, the psychologist thoroughly presents and discusses the treatment rationale with the patient and also encourages the patient through the treatment.

Brief description of interventions

Exposure is the most important intervention in CBT treatment of anxiety related to particular situations and objects. During exposure the patient gradually approaches the anxiety-provoking situations and objects identified. The patient then is encouraged to perceive all facets of the anxiety reaction, until the anxiety typically diminishes. The psychologist helps the patient not to use previous strategies to avoid the situation and the anxiety reactions. Exposure is achieved by using the dental treatment room with all instruments available; however, most important is the use of DVD scenes of a non-dentally anxious patient attending dental treatment (Table 8.1). The patient views the scenes sitting in the dental treatment chair (Figure 8.2).

Progressive relaxation (O'Donohue et al. 2003) is another central intervention in this model of dental phobia treatment. At the beginning of the phobia treatment, the patient learns a muscle relaxation technique and practises this technique at home four to seven times a week

Table 8.1 DVD scenes used for exposure.

<i>Scene</i>
Making an appointment with the dentist (phone call)
Coming to reception
Sitting in waiting area (without and with sound of drilling)
Going to treatment room
Dental team preparing room
Dentist talking to patient
Radiographic examination
Dentist explaining result of radiographic examination
Examination
Local anaesthesia (divided into eight scenes for patients with injection phobia)
High-speed drill (three scenes)
Low-speed drill (three scenes)
Filling
Removal of calculus (three scenes)
Impression
Endodontic treatment
Extraction



Figure 8.2 Exposure. Reprinted with permission from *Swedish Dental Journal* (Hägglin C. and Wide Boman U. (2012). A dental phobia treatment within the Swedish National Health Insurance 36: 71–8)

during the first weeks of treatment. Exposure and relaxation interventions are combined (following the focus on systematic desensitization at the clinic from the 1970s; and the biofeedback technique may be used to facilitate relaxation).

With *cognitive restructuring* (O'Donohue et al. 2003) the patients' dysfunctional thoughts and images are identified and challenged. *Psycho-education* is used to teach the patient about fear and anxiety reactions, thereby normalizing the reactions. Patients with blood-injury-injection phobia, and a tendency to faint due to a marked drop in blood pressure, learn the technique of *applied tension* (Öst and Sterner 1987). *Self-assertiveness techniques* (O'Donohue et al. 2003) are especially important for patients with traumatic experiences. Throughout the treatment, *behavioural experiments* (Öst 2006) are planned and conducted, allowing the patient to try out new forms of behaviour with the psychologist and especially in the following treatment at the dentist.

Content of treatment sessions

During the first session the psychologist presents to and elaborates with the patient the behavioural functional analysis based on the anamnestic interview and questionnaire data. The nature of anxiety reactions and the rationale of the treatment are presented and discussed (this continues during treatment when indicated). This initial phase includes psycho-education concerning anxiety reactions and avoidant behaviour. At the same time exposure intervention starts with the patient entering the dental treatment room and then sitting in the treatment chair. During the first session the patient practises muscular relaxation using a 20-minute programme, sitting in the treatment chair. Biofeedback techniques may be used to illustrate differences in tension/relaxation levels. The patient receives a CD of the relaxation programme and is instructed to practise at home during the first weeks of treatment. During the following sessions exposure treatment continues, with the use of the treatment room and chair, instruments and DVD scenes (see Table 8.1), in combination with relaxation techniques and cognitive restructuring interventions. If indicated, applied tension and self-assertiveness training are included in the treatment. The last session with the psychologist (usually session number 7) includes planning of the clinical rehearsals/confirmatory treatment at the dentist, in terms of behavioural experiments and continued exposure. The issue of a relapse prevention programme is discussed, how to maintain the new behaviours and how to handle situations provoking dental anxiety in the future. See Table 8.2 for an overview of the content of treatment sessions with the psychologist.

Table 8.2 Content of treatment sessions with the psychologist.

Session 1	Behavioural functional analysis, rationale, psycho-education Exposure (treatment room, treatment chair)
Sessions 2–6	Muscular relaxation practice (biofeedback) plus instruction to practise at home If indicated, applied tension practice and self-assertiveness training Continued exposure using the room, instruments, DVD scenes Relaxation
Session 7	Cognitive restructuring Planning of continued treatment with the dental team, in terms of behavioural experiments Prevention programme

After a maximum of seven sessions with the psychologist the patient continues phobia treatment with clinical rehearsals/confirmatory treatment at the dental treatment room. For patients with oral injection phobia, clinical rehearsals are usually made with a specially trained dental nurse before the patient visits the dentist. The psychologist usually does not attend the sessions at the treatment room, as the goal is for the patient to become independent and confident when visiting a dentist. The goal of the clinical rehearsals and confirmatory dental treatment with the dental personnel is to provide the patient with new experiences of dental care. These sessions have the function of further exposure and behavioural experiments, while at the same time providing the required dental treatment.

Based on the evaluation made by the psychologist, the patient and dentist summarize progress so far and jointly make a treatment plan for the following session, taking into account both the patient's current dental treatment need and aspects/situations important to rehearse following phobia treatment. The clinical rehearsals/confirmatory treatment phase then typically start with a thorough examination including the use of the probe and then continue with restorative treatment according to the treatment plan. The patient is encouraged to try and evaluate new behaviours learned in the sessions with the psychologist, while simultaneously managing dental care.

After treatment the patient completes self-rating questionnaires on dental anxiety, and the dentist rates how the patient was able to receive dental treatment. Finally the patient is referred to general dental care.

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One-Session Treatment of Dental Phobia

Lars-Göran Öst

Background

Psychological treatments, i.e. behaviour therapy, for phobias started in the 1960s with British researchers like Gelder and Marks (1966) working with agoraphobia and Americans like Bandura et al. (1969) developing treatments for specific phobias. The first studies on social phobia were published in the 1970s (Argyle et al. 1974). During the 1960s and the 1970s the three main categories of phobias were not differentiated when it came to treatment – all were basically treated in the same format of once a week sessions of one hour for 10–15 sessions or more.

Why develop a one-session treatment (OST)?

In my early clinical work I followed this general format even if I tried to reduce the total number of sessions. One problem that often occurred was return of fear between sessions. If the first session led to a reduction of the patient's Subjective Unit of Disturbance (SUD) level from say 90 to 60, the second session did not start at a SUD level of 60 but most often at 70–75. Then it went down from there and so on. In an attempt to try to get rid of this return of fear I decided to see if it was possible to carry out the entire treatment in just one session, which was prolonged to a maximum of three hours. The first specific phobia patient I offered to treat this way had spider phobia and the treatment went well, taking 2.5 hours. Instead of publishing this case study I decided to do a case series of 20 consecutive patients in order to have a larger sample for evaluation of the efficacy of the treatment form. It took about seven years to collect these patients since specific phobics rarely apply for treatment. When I then followed them up on average four years after the treatment it turned out that 90 per cent were recovered or much improved after a mean treatment time of 2.1 hours (Öst 1989).

Which specific phobias are suitable for one-session treatment?

Since the first use of OST in 1980 I have used this treatment in about 500 patients in randomized controlled trials (RCTs) on the method and in about the same number of patients in ordinary clinical work. Regarding animal phobias, OST has been used in RCTs for spider and snake phobia and in clinical work for phobia of dogs, cats, rats, birds, wasps, frogs, lizards, worms, ants, insects and hedgehogs. When it comes to other specific phobias RCTs have been carried out on blood, injection, dental, claustro- and flying phobias, whereas it has been used clinically for phobias of deep water, thunderstorms, heights and vomiting. The conclusion is that OST is a suitable treatment for any type of specific phobia as long as it is possible to expose the patient to the anxiety-arousing stimuli.

Acceptability of one-session treatment

In the 13 RCTs on various specific phobias that I have carried out as principal or co-principal investigator a total of 493 patients have been randomized to the OST condition. Of these four (0.8 per cent) have declined participation after being informed about which treatment they would receive. This figure gives what probably is the highest acceptance proportion (99.2 per cent) of any cognitive behavioural treatment. Furthermore, the attrition rate for OST in these studies is zero, which means that every single patient completed the treatment.

Results of one-session treatments

The case series described above gave the necessary clinical and empirical background to start carrying out RCTs on the OST and today there are about 30 RCTs published from researchers in Sweden, Norway, England, Holland, Germany, Austria, USA, Canada and Australia (Öst 2010). A meta-analysis of these studies shows that OST yielded significantly higher effect sizes than wait-list control groups (Hedges' $g=2.13$), than placebo control groups ($g=0.85$) and even better than an active treatment ($g=0.81$). According to Cohen's rule of thumb for effect sizes (Cohen 1982) all of these are considered as large since they are above 0.80.

The American Psychological Association's Task Force (Chambless and Hollon 1998) on empirically supported treatments developed decision criteria. According to these, in order for a treatment to be considered well-established (the highest evidence level) there has to be at least two methodologically rigorous RCTs, performed by different research groups, showing that the treatment in question is significantly better than a placebo control group or another active treatment. The OST fulfils these criteria both regarding OST studies for adult and for children.

The proportion of patients achieving a clinically significant improvement (Jacobson and Truax 1991) varied from 80 per cent for claustro- and injection phobia, to 93 per cent for flying phobia. When the patients were followed-up one year after the treatment the results were either maintained or furthered, with the exception of flying phobia for which deterioration to 64 per cent was observed.

General Description of the One-Session Treatment

The pre-treatment clinical interview

The therapist meets with the patient for a clinical interview, usually one week before the treatment session. There are three purposes to this interview. First, to ascertain that the patient has a specific phobia and that it is not part of agoraphobia where people avoid enclosed spaces as in claustrophobia. Second, to do a brief cognitive behavioural analysis of the patient's phobia in order to arrive at the maintaining factors. Third, to describe the OST in general terms to the patient.

Diagnostic interview

I usually use the specific phobia section of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; DiNardo, Brown and Barlow 1994) completed with some additional questions. This takes 30–45 minutes to go through depending on how talkative the patient is and gives a broad picture of the patient's phobia. It is, of course, possible to use some other semi-structured interview, e.g. the Structured Clinical Interview for DSM-IV (SCID; First et al. 1997) or the M.I.N.I. (Sheehan et al. 1998), which only has questions on the actual diagnostic criteria and gives no surrounding information as the ADIS-IV does.

Brief cognitive behaviour analysis

One important part of the pre-treatment interview is to find out what maintains the individual patient's phobia. According to the model described by Öst (2012) it is the strong conviction that the catastrophic belief of what an encounter with the phobic situation would lead to that is the important maintaining factor. In order to elicit the patient's catastrophic belief you should ask him/her to *imagine* being in the worst phobic situation and not being able to escape from it. Then you get them to describe the *worst consequence* he/she thinks will occur as a result of the encounter. When the patient has done that you let him/her rate (0–100 per cent) *how convinced* he/she is that this outcome will occur when being in the phobic situation and having a strong anxiety reaction. Finally, you let the patient rate the conviction when sitting in the therapist's office talking rationally about his/her phobia. This procedure is illustrated below for a patient with dog phobia.

- T: What is the worst thing you fear will *happen* when you encounter a dog?
 P: I don't know. I'll scream and run away.
 T: Imagine that you cannot leave the situation.
 P: I would freeze and just stare at the dog.
 T: What do you think that the dog would do?
 P: Sooner or later it would run up to me, jump on me and bite me.
 T: What would happen with you then?
 P: I would die.
 T: How would you die?
 P: From the shock. My heart would not stand it.
 T: OK. The worst that you imagine could happen is that you will die. How convinced are you (0–100 per cent) *in the situation*, when you are in contact with the dog that it will lead to your death?

P: 100 per cent.

T: And how convinced are you *now when you are sitting here* talking rationally to me about it?

P: 25 per cent

After having obtained the catastrophic belief I have found it to be a good idea to normalize the patient's description by saying: 'Since you *believe* so strongly in the catastrophe it is logical to avoid/escape the phobic situation. However, this *prevents* you from obtaining new information that can correct the false belief and, thus, the phobia *remains* unchanged!'

Description of the OST

The final part of the pre-treatment interview is to describe the OST to the patient. This is done in general terms since you do not want the patient to get hung up on details and not get the big 'picture'.

First you describe the rationale for the treatment, *tailoring* the description of the treatment to the individual patient's problem behaviours. You say that the purpose of the OST is to expose the patient to the phobic situation in a *controlled* way, enabling him/her to obtain new information that can correct the false catastrophic belief. The reason why control is emphasized is that any anxiety disorder patient will find the situation considerably less anxiety arousing if they experience having control in the situation. However, during the latter part of the OST we purposely insert components of less and less control so that the patient will experience managing that. Furthermore, since the adult patients seen in treatment have had their phobia for 20–30 years on average it might be difficult to understand and encompass that all the treatment it takes is three hours. Thus, you say that the OST should be seen as a start of something that the patient should continue on his/her own afterwards.

Then you highlight the differences between the OST and natural encounters with the phobic object. Natural encounters are unplanned, ungraded, uncontrolled, very brief and usually the patient is alone, whereas the OST is planned, graded, controlled, prolonged and done as a teamwork between patient and therapist.

Finally, you draw the anxiety curve (Figure 9.1) to help the patient understand the principles behind the OST. In describing this curve you emphasize that what the patients are doing in natural encounters with the phobic object is to escape, since they strongly believe that remaining in the situation would lead to the catastrophe. By escaping they will experience that the anxiety level is reduced fairly quickly and they will conclude that 'it was only by escaping that I prevented the catastrophe from happening'. However, the escape also means that the patients will not learn what happens if they remain in the situation, i.e. that the anxiety goes up to 75–80, plateaus there and then goes down providing that the patient remains exposed to the phobic object all the time. In a way the anxiety curve describes two predictions that can be tested in the OST; the patient's that the catastrophe will occur if he/she stays in the situation and the therapist's that the anxiety will be reduced and the catastrophe will not happen. At the end of the description of the anxiety curve I also cross out the escape since this prevents the patient from obtaining the information necessary to enable a correction of the catastrophic belief. It is important to get the patient to accept that escape from the phobic situation is not acceptable during the OST. Sometimes you encounter patients who say that the anxiety curve seems logical, but they do not think that it applies to them. This doubt is quite acceptable as long as the patient is prepared to test it out in a real phobic situation. As soon as you get the patient into the phobic situation

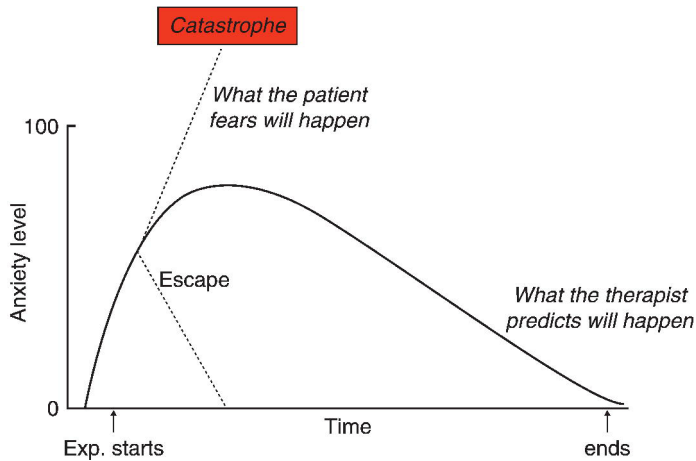


Figure 9.1 The anxiety curve

and stay there he/she will realize that the anxiety curve is a correct picture of what happens in the OST.

Naturally, patients have to be quite motivated in order to experience rather high levels of anxiety during the OST, with a possible duration of three hours. Usually, I just ask one question to get a good idea of the patient's motivation for treatment. Before asking the question I tell the patient to think about the answer for a while and not reply immediately. The question is: 'Is there anything that you are *not prepared to do* in order to overcome your phobia?' The most common answer is 'No', but sometimes the patient will describe something that reveals a misunderstanding of the OST, giving the therapist the opportunity to clarify these issues. The most peculiar answer I have ever got was from a 30-year-old woman with spider phobia. She thought for about a minute and then said: 'I am not prepared to divorce my husband'. This clearly indicated that she would do anything that had to do with confronting her phobia.

Pre-treatment instructions

At the very end of the pre-treatment interview I give the patients some instructions which are important for them to understand as they leave the interview. First, the treatment is done as a *teamwork*. This means that both the patient and the therapist have responsibility for carrying out the OST. The most important instruction is that *the therapist will never do anything unplanned in the therapy situation*. This means that whatever step in the exposure the therapist wants the patient to take he/she will first describe it verbally, demonstrate it and get the patient's 'Yes' to performing the step in question. If a patient says 'No' to a step then the team will have to come up with a step that is easier than the one declined, but still more difficult than the last step completed. This instruction also means that the patient always has the final word about what to do in the OST and the therapist will never force a patient to do anything against his/her will.

Another instruction is that a high level of anxiety is not a goal in itself. I have done OSTs when the patient did not reach a higher SUD level than 40–50, but this does not matter as long as the patient gets the information necessary to correct the catastrophic belief. Finally, I say that the treatment will not break the patient's 'personal record' of anxiety, i.e. the highest

anxiety he/she had ever experienced in a phobic situation. This is usually comforting since they survived the worst situation and they will certainly survive the OST as well.

The actual treatment session

The OST can be described as a flexible combination of exposure *in vivo* and cognitive restructuring with the addition of participant modelling for patients with animal phobia.

Exposure in vivo

The exposure treatment is prolonged (up to three hours) and gradual (a large number of small steps which are gradually more anxiety arousing). Since all the treatment is done in one prolonged session, people sometimes misunderstand and think that it is a flooding type of exposure. This is not the case at all. The OST is done according to an individual anxiety hierarchy. After having completed one step and experienced the anxiety reduction the increase in difficulty to the next step will not be experienced as particularly large.

A prerequisite for the OST is that the patient makes a *commitment* to remain in the situation until the anxiety fades away. In general terms the patient is encouraged to *approach* the phobic stimulus to a certain extent (Step 1) and to *remain* in contact with it until the anxiety has decreased to some extent (20–25 SUD points). Then he/she is instructed to approach further (Step 2) etc. until the entire hierarchy has been worked through. The therapy session is not ended until the anxiety level has been *reduced* by at least 50 per cent, or completely *vanished*.

Participant modelling

This treatment method consists of three components: (i) the therapist first *demonstrates* how to interact with the phobic object; (ii) the therapist then helps the patient gradually to *approximate* physical contact with the phobic object; and (iii) the patient *interacts* with the animal on his/her own, only with the help of the therapist's instructions.

Cognitive restructuring

Whenever there is a good opportunity during the exposure a *behavioural test* of the patient's catastrophic cognition, or some part of it, is carried out. Take the snake phobic who believes that holding one's hand close to the snake's mouth would lead to being bitten. That belief can be tested by the therapist first using modelling by putting his/her hand close to the snake's mouth and then helping the patient to do the same thing. The patient is instructed to closely observe what is happening and then verbalize aloud what actually did happen. Towards the end of the OST it is recommended to ask the patient for a new rating of the conviction of the catastrophic belief and then set up a definitive behavioural test of it. We can once more exemplify with the snake phobic whose ultimate catastrophic belief was that: 'if a snake is on the floor of the room I am in it will crawl up to me, up my legs, underneath my clothes and bite me. I would then die of the shock because my heart cannot stand that much anxiety'. Phobic patients generally jump to conclusions when it comes to their phobic situations. In the described case the jump is from 'being in the same room as a snake on the floor' to the catastrophe 'dying'. Before testing this belief it is necessary to help the patient to realize that there is a series of steps, like links in a chain, which have to occur before the final step, the catastrophe, can occur.

In this situation Step 1 is that the snake actually crawls all the way to the patient's feet. Step 2 is that the snake crawls up the patient's legs, Step 3 is that it crawls underneath the patient's clothes, Step 4 is that it bites the patient and Step 5 is that the patient dies due to heart failure. If Step 1 does not happen then Steps 2–5 cannot happen. If Step 1 but not Step 2 happens then Steps 3–5 cannot happen, and so on.

This patient's pre-treatment rating was 95 per cent, which had been reduced to 40 per cent after two hours of the OST. The behavioural test entailed placing the snake on the floor 3 m in front of the standing patient and with its head pointing directly towards the patient. If necessary, the therapist can use physical aids to help the patient remain on the same spot, observing what the snake is doing. Usually, the snake starts crawling towards the patient but then deviates in some other direction. Then the test is repeated a number of times by placing the snake on the floor gradually closer to the patient who continues to observe where it is going. Sometimes it happens that the snake crawls all the way up to the patient (Step 1) and then across the upper leather or between the sole and the heel of his/her shoes. However, in my experience Step 2 has never occurred. The illustrated patient needed three trials to conclude that Step 1 did not occur and the test was ended. After the test you ask for a new belief rating. For this snake phobic it was 0 per cent.

The goal of the OST is that the conviction rating should be down to zero before ending the session. The reason is that if some part of the patient's catastrophic belief is left untested this constitutes a risk for relapse after the treatment session. If the patient's rating is not 0 per cent and there is still time left in the session, the part of the catastrophic belief that has not been tested yet should be subjected to a specific behavioural test.

The therapist–patient relationship

A good working alliance (Horvath et al. 2011) is to my mind *necessary but not sufficient* for a good treatment outcome in any type of cognitive behaviour therapy (CBT). Upon this alliance you can and have to build with specific treatment methods as described above in order to achieve a good treatment effect. The therapist has the largest responsibility for creating a good relationship and this work starts as soon as the patient enters the therapist's office for the screening interview, continues during the entire therapy session and into the maintenance phase. Of utmost importance here is the *teamwork* principle, which means the combination of two experts' knowledge – the patient being the expert on his/her emotions and cognitions and the therapist being the expert on the treatment. The teamwork also means that both therapist and patient are expected to work equally hard during the session to achieve the treatment goal and there is an open and honest communication between them.

Examples of relationship-creating procedures

Examples of what the therapist can do to create a good relationship are: (i) to always take the patient's problems seriously; (ii) to answer the questions that the patient has in an honest way (with one exception, see below); (iii) to give the patient factual information about his/her phobia; (iv) to suggest exposure tasks as close to the patient's current limit as possible which will help progress; (v) to be generous with positive reinforcement as soon as the patient approaches the phobic object/situation; and (vi) to never fail the patient's confidence in the therapist.

The post-treatment interview

One week after the OST a post-treatment interview is done. One purpose is to evaluate how the patient experienced the treatment, if there was anything that he/she missed, considered superfluous, or would have liked it to be carried out differently. The main purpose is to describe the maintenance programme and offer the patient to participate in it.

The maintenance programme

The therapist starts by describing the difference between a setback and a relapse and the steps to follow if a setback occurs. A setback is a temporary failure to manage a formerly phobic situation that already has been managed after the OST, whereas a relapse means that the patient is back to square one, experiencing as much anxiety and avoidance as before the treatment. It is also explained that the process starts with a setback and it is the patient's choice to let it develop into a relapse or not.

The programme per se runs for 24 weeks and the patient agrees to carry out at least two exposure activities in relation to the phobic object per week, note them on a record form and mail the form to the therapist every four weeks. In addition, they are invited to write down personal experiences on the reverse side of the form. When obtaining a filled-out form the therapist can quickly scan it and see if the patient is continuing his/her self-exposure as agreed or not. If this is not the case the therapist can phone the patient and a 10–15 minute telephone call can put the patient back on track again.

One-Session Treatment of Dental Phobia

Initial instructions

The session starts with repeating the instructions given at the end of pre-treatment interview, emphasizing that the patient always has the final decision whether to do a certain step or not. In addition the anxiety curve should be repeated and in connection with saying that anxiety is not dangerous just very uncomfortable to experience. Also, the patient is alerted to the use of the SUD scale (0–100), where 100 represents the strongest anxiety he/she has ever experienced in the dental treatment situation. It is explained that the exposure is graduated into a large number of steps, that the dentist will suggest a new step and that the patient says 'Yes' or 'No' to performing it. In instances of the patient saying 'No' the patient–dentist team will have to work together to come up with an easier step than the one suggested by the dentist. The dentist also points out the importance of an open and honest communication and that the patient should always know what is going on in the treatment, otherwise he/she cannot fulfil the role of a team member. Finally, the team has to agree on a 'Stop signal', e.g. raising one arm, to indicate that the patient wants the dentist to temporarily stop the current procedure due to pain or an anxiety level that was experienced as 'too high'. This is also a way for the patient to have control over what is happening in the treatment session.

Experience of pain during the treatment

Most dental phobia patients fear that the pain they might experience during dental work will be unbearable. Thus, one goal of the OST should be to show the patient that the dental

treatment can be carried out with the patient experiencing low levels of or no pain during the session. This can be achieved by giving the patient enough anaesthetic injections and checking that the tooth to be drilled in and the surrounding gum are properly anaesthetized. However, the dentist should say that even if the aim is to render the patient completely anaesthetized this cannot be guaranteed. If the patient experiences pain during the dental work he/she should just alert the dentist to this and more anaesthetics can be administered. It is important for the dentist to emphasize that if the patient were to experience pain it is not because the dentist tries to deceive him/her but due to the fact that each patient is unique when it comes to the amount of anaesthetic that is necessary in order to become completely anaesthetized in the specific area.

Initial steps

As a first step, which will engage the patient in the treatment, it is recommended that the dentist and patient sit down in front of the light panel and go through the radiograph of the patient's teeth. The patient will probably get the most information out of this if the dentist points out where in the patient's jaws the tooth seen on the radiograph is situated. This will give the patients factual information about his/her dental status which is better than the opinion they have themselves. The latter is to a large extent driven by the anxiety-based fantasies that the dental phobic has.

As a next step the dentist should do an oral examination just using the mirror since a probe may cause pain in the not yet anaesthetized patient.

The anaesthetic syringe

The next step is to bring out the syringe without the needle attached, show it to the patient and let him/her handle it. This is usually done with relatively little anxiety. Then the needle with the cap on and the container with the anaesthetic fluid are attached to the syringe and the patient once more is given it to handle. This step commonly arouses more anxiety since the patient knows that what causes pain – the needle – is present even if it is covered with a plastic cap. After a while it is time to remove the cap so that the patient can see what size (length and circumference) the needle has. He/she should handle the syringe with needle on, touching the needle's shaft and then its tip with his/her fingertips. When enough anxiety reduction (20–25 SUD points) is seen then it is time to go on, approaching the real situation.

First, the dentist suggests a step consisting of just putting the needle with cap on in the oral cavity and then removing it. Then this step is repeated a number of times with the needle being kept in the mouth for gradually longer times. The goal should be as long a time as it takes to give a normal anaesthetic injection with normal pressure.

Second, the dentist suggests doing the same thing, but now with the plastic cap removed from the needle. The needle is just in the mouth, a couple of centimetres away from the gums. As in the previous step the needle is put there for gradually longer periods of time.

The third step is to put the tip of the needle on the surface of the gum, but without penetrating the gum. This is also repeated a number of times so that the patient can stand having the needle there for as long as it would take to give an injection.

The anaesthetic cream

In order to reduce the risk of the patient experiencing pain when the needle is inserted in the gum some anaesthetic cream is put on the gum and left to act for a couple of minutes before the syringe is used to give an anaesthetic injection. It is recommended that the dentist's probes the gum to make sure that it is properly anaesthetized before the needle penetrates the surface of the gum.

Giving an anaesthetic injection

This procedure is started by inserting the needle in the gum and just injecting a drop of the anaesthetic fluid before removing the syringe from the oral cavity. Then the dentist continues to insert gradually more fluid in small but gradually increasing steps. This is enabled by the fact that the more fluid that has been injected the more anaesthetized the patient becomes. The procedure ends when the amount of anaesthetic fluid that the dentist considers necessary in the current situation has been injected. Before continuing with the next procedure probing the gum is recommended and if the patient experiences pain anywhere more anaesthetics should be given.

Demonstration of utensils

Before starting to drill it is recommended that the dentist demonstrates the different utensils that may come to be used: the drill, the suction, the air blower, the water blower and so on. It is necessary to actively involve the patients in these demonstrations and encourage them to ask any questions they may have concerning the utensils. One can even use the drill on one nail of the patient so that he/she can observe close up how it works. This part of the session also means that the patient is exposed to the various sounds produced by these utensils, something that many patients experience as anxiety arousing.

Drilling

Analogous to giving an injection the first step in this procedure is to just to hold the drill and the suction in the patient's mouth for a few seconds and then remove them. This is gradually increased in small steps, e.g. five-second increments, until the drill can run in the mouth for as long as an average drilling takes.

Next, actual drilling of the anaesthetized tooth is started. In a similar fashion as with the injections the dentist first drills the tooth for a few seconds and then removes the drill. Then the drilling time is gradually increased until the patient can stand letting the dentist drill the tooth for as long as it normally takes. If during this procedure the patient is experiencing any pain the drilling is put on hold while some more anaesthetic is given and left to act.

Filling

Before filling the hole it is a good idea to demonstrate the apparatus that hardens the filling so it will not come as a surprise to the patient when it later is put in his/her mouth. Since the patient is properly anaesthetized putting the steel band around the drilled tooth is usually little

of a problem and so is putting the filling in the drilled hole and hardening it. This is then followed by polishing the filling surface so that a proper biting position is obtained.

Ending the session

Before ending the OST the dentist should ask the patient for a rating of the catastrophic belief that he/she described during the pre-treatment interview. If this rating is not down to 0 a more direct behavioural test of the belief should be made. There should also be a check of any other beliefs that may have come up in the patient's mind during the session and adequate behavioural experiments administered.

The session ends with the dentist asking the patient to summarize what he/she has learnt during the OST, particularly concerning the catastrophic belief but also in general. If the patient seems to be leaving out important parts of the summary the dentist should bring these up so that as full a description as possible of the patient's learning is provided. Finally, the therapist and patient discuss how the patient should carry on after the OST in order to generalize his/her learned skills to situations with an ordinary dentist. To help the patient in this respect the dentist will write a letter to the ordinary dentist describing the treatment in general terms but in particular how the current patient wants to be treated in order to feel in control of the situation.

Training Dentists to do the One-Session Treatment

In all the other specific phobias for which OST has been applied, in RCTs or clinically, the treatment is performed by psychologists having at least a basic training in CBT. They carry out every aspect of the treatment necessary for the patients to obtain the new knowledge they need in order to correct their false beliefs. Transferring this principle to dental phobia means that various amounts of dental work have to be done during the OST for the patient to overcome his/her dental phobia. It will most probably not be enough with the psychological treatment focused on the patient's fears in the situation. Since it is not possible to teach psychologists to do dental work we have chosen to teach dentists to do the anxiety treatment using basic CBT methods.

Training programme

At the Center for Odontophobia, University of Bergen, we have devised and carried out a training programme involving both dentists and psychologists working as pairs at their different dental clinics. The psychologist's role is to do the pre-treatment interview to ascertain a diagnosis and exclude possible differential diagnoses and to carry out the brief cognitive behaviour analysis regarding maintaining factors. Furthermore, the psychologist will transfer the obtained information to the dentist and help him/her to plan the treatment.

Components of the programme

The first part of the programme contains 20 hours of theoretical lectures covering an overview of CBT, treatment research in dental phobia, the dentist as anxiety therapist, building a good therapeutic relationship, diagnosis and differential diagnosis, CBT for dental phobia and blood-injury-injection phobia and problems and challenges. This is followed by a written

exam. The second part (12 hours) is focused on practical video demonstrations of CBT in dental phobia, interspaced with role plays of key techniques shown in the videos. The third and final part of the programme consists of treating a number of dental phobics who have applied for treatment due to their phobia. These treatments are video recorded and the treatment sessions are evaluated by an expert in the treatment method. In order to pass this last component and become certified the dentists have to fulfil the criteria for at least three out of four patients. In these evaluations the expert uses a 13-item rating scale (see below) for OST competence devised by Öst (2001). The pass criterion is that the rating is at least 4 on the 0–6 scale for each item with no compensation being allowed.

What if a dentist does not pass?

In those cases failing the criterion the dentist will get two new patients and now has to pass the criterion on four out of six patients. If the dentist still does not fulfil this criterion perhaps he/she should not work with OST for dental phobia. Maybe the competence is enough for exposure treatment across multiple, e.g. five sessions, where the dentist always has the possibility to consult a supervisor between sessions if problems occur.

Maintenance of the treatment skills

Since there is a risk of deterioration of the therapeutic skills over time this could be counteracted by a renewed evaluation once a year. If all treatment sessions are video recorded the dentist should select one session, preferably at random and send it to the expert for evaluation. If the dentist fails the evaluation, then two new cases should be treated, video recorded and reevaluated.

Evaluation of Dentists Carrying Out OST

I have developed a rating scale in order to evaluate the therapist's competence in carrying out OST irrespective of what type of specific phobia is being treated (Öst 2001). It can be used as a general measure since it is the CBT variables that are evaluated and not e.g. the dental work. Below follows a brief description of each variable in the scale.

1 Creating a good and trustful therapeutic relationship with the patient

As in all forms of psychological treatment it is necessary that the therapist creates a relationship with his/her patient that is good, open and trustful. The patient should experience the therapist as an expert of the treatment, someone who really knows how the treatment is carried out. Moreover, the relationship must be trustful, i.e. if the therapist promises that he/she will not do anything without the patient's permission then the therapist will not go back on that promise.

2 General instructions before the start of the exposure

The instructions that were given at the end of the pre-treatment interview describe very important general principles for OST and they should be repeated at the beginning of the treatment session. One way of doing this is to ask the patient to repeat what he/she remembers of these

instructions which will give the therapist an opportunity to complete any missing information. It should be done as a conversation and not as a test of the patient's memory. Special emphasis should be put on the second instruction, i.e. that the patient always has the final word concerning what steps should be carried out in the exposure and how far he/she wants to go.

3 Specific instructions during the session

My experience after 30 years of doing OST is that you cannot be excessively explicit in your instructions concerning the various steps in the exposure. Due to a high anxiety level in the patient there is always a risk that some of the instructions are not perceived properly or not remembered when the behaviour is to be carried out. Thus, there is usually no problem in repeating the same detailed instruction before a new step is started. What is important is to be specific so that the patient never has to be in doubt about what he/she is going to do. We do not want a situation where the patient did something that turned out to be unnecessarily anxiety arousing just because the therapist gave vague instructions.

4 Factual information about the phobic object/situation

Most specific phobics have gone through a generalization process from the starting point of their phobia – the real object or situation – via films, still photos and written text about it. This has the consequence that e.g. animal phobics experience anxiety just by reading about the animal they fear and they have very little knowledge about it. Providing the patient with simple factual information, e.g. about how snakes live, what sense organs they have, how often they eat, and so on, can be done during parts of the exposure when the patient is rehearsing what they have just learned. Obtaining this information can correct some of the misunderstanding that the patient might have concerning his/her phobic object or situation.

5 Dealing with questions

A good therapist is always open to questions that the patient might have during the OST and answers them in an open and honest way. In fact, the therapist should, on a continuous basis, invite the patient to ask any questions he/she has concerning the current step in the exposure or anything else concerning the OST. Sometimes patients ask about the final step of the exposure. This is the only question that the therapist does not answer. Instead the patient is reminded that he/she always has the final word whether to attempt a new step or not. The therapist suggests new steps but the patient decides; consequently, he/she can at any time during the OST decide that the last step carried out was the final and no more steps will be attempted. There is a clear reason why the therapist does not describe what the final step is. If this is a situation that is very anxiety arousing to the patient, which almost often is the case, he/she would only ruminate about how difficult the final step would be and have major difficulties managing the current and much easier step in the hierarchy.

6 Continued exposure during the session

Since the OST has a maximum time of three hours it is important that the exposure is going on more or less continuously during this time period. There should not be periods of time during

the session when the patient has a ‘vacation’ from the exposure. Such time periods can reinforce avoidance behaviour due to the anxiety reduction they entail. It is, however, okay with brief periods during which the therapist explains something concerning the phobic object/situation and when the exposure consists of just repetition of the current step. Thus, you do not remove the phobic object from the patient’s field of vision; it is present during the entire OST.

7 Guiding the patient in the exposure procedure

Despite giving detailed instructions before a new step is attempted the therapist has to be active and guide the patient regarding what to actually do during each step of the procedure. Without this guiding there is a risk that the patient does the step in a way that is awkward or unnecessarily anxiety arousing, e.g. when it comes to having a spider walking on one’s hands and arms. With repetition as the session progresses the need for detailed guiding will be reduced and towards the end of the session the patients generally need very little guidance.

8 Adequate use of modelling during the session

Instead of just verbally describing what the patient should do at a new step of the exposure the therapist should model the behaviour by doing it first. The next step is to physically help the patient to do the same behaviour and then gradually reduce the physical aids. The final step is to just use instructions and tell the patient what to do. A good therapist uses modelling in a way that is individualized to the need of each patient and knows when the physical aids should be removed. Continuing too long with these aids might give the patient the false impression that it is only by the therapist closeness and physical help that he/she is able to carry out this behaviour. The goal is to make the patient independent of, not dependent on, the therapist.

9 Adequate use of verbal reinforcement

It is important that the therapist gives the patient praise when he/she is approaching the phobic object/situation and doing some proactive behaviour that will lead to a reduction of anxiety. However, sometimes you see trainees who use superlatives like good, great, super, marvellous, etc. in a completely indiscriminative way. They may praise the patient as often when he/she retracts from the phobic object as when approach behaviour is displayed. This is very confusing to the patient, not knowing which behaviour is praised by the therapist and there is a risk that escape behaviours get reinforced. Thus, I recommend using praise less often than some trainees do and only when the patient has done something good that will lead to a reduction of his/her phobia.

10 Working with the patient’s catastrophic beliefs

Most therapists can design behavioural experiments to test the patient’s catastrophic belief that was elicited during the pre-treatment interview. This should not be done too early but towards the end of the session when the patient has experienced enough anxiety reduction due to the exposure procedures. However, it often happens earlier during the session that the patient verbalizes a cognition that may be part of the main catastrophic belief. For example, a spider

phobic asked to put his/her hand on the bottom of the plastic bowl where the spider is will say 'then the spider will immediately run up my hand.' A good therapist will catch the opportunity and ask the patient 'is there any way we can test this prediction?' whereas a less competent one will just let it pass by without any verbal response. This behaviour on the therapist's part may give the patient the impression that his/her prediction was correct since the therapist did not bother to disagree with it.

11 Pacing and efficient use of time

Since the OST only consists of three hours it is necessary to use this time in an efficient way in order to be able to work through the hierarchy during this single session. Beginner therapists often use too much time on each step, particularly the first ones, which means that they have not completed the hierarchy when the time is up. The primary reason for this is that they believe that the patient's SUD rating has to go down to a low level before they can progress to the next step. However, my experience is that you only have to see a moderate reduction (20–25 SUD points) before the next step can be suggested. Following this principle will enable the therapist to complete the hierarchy in time.

12 Description of how to continue with self-exposure after the session

The session should end with a brief description of how the patients ought to continue with self-exposure, using everything they learned during the OST, after the session had been completed. As described earlier, some patients need to continue exposing themselves to the phobic situations in order to cover all the potentially anxiety-arousing situations, whereas for other patients the single session is enough. Irrespective of what category the current patient may belong to, I recommend that the therapist should try to reach an agreement with the patient that avoidance of phobic objects/situations is a characteristic of the past. If they never avoid these situations in the future they do not fulfil diagnostic criteria for specific phobia.

13 Handling difficulties in the exposure procedure

In the majority of OSTs the therapist–patient team will at least once run into difficulties with the exposure. The first measure to take is to call upon the patient–therapist team to suggest another way of doing the exposure that will not be experienced as so difficult. If this does not work, ultimately the therapist has the responsibility for the treatment leading to the goal. A good therapist will use all of his/her creativity and try to come up with ways of circumventing the difficulty instead of 'hitting his forehead against the brick wall' as a not so good therapist might do.

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The Combined Treatment

Erik Skaret

Background

During my first 10 years as a dentist in the public dental service and my next 10 years in private practice, I spent a lot of time working with fearful dental patients in all age groups. I enjoyed this work, as dentists do if they manage to help these patients to gradually cope with ordinary dental treatment. However, since I had no specific qualifications in behavioural science, I did not know which of the factors in my fear treatment contributed most to my successes and failures. The treatment approach in the beginning was based on my own intuition and then on what the patients gradually taught me. I think this is a typical story for dentists who are interested in this area.

My interest and clinical experience finally brought me into the academic field. During the years at the Center for Odontophobia, University of Bergen, Norway and in the Dental Fears Research Clinic, University of Washington, Seattle, USA, I had the privilege to work with competent colleagues and psychologists in this field and gradually learned the empirically based treatment approaches for dental phobia. I was thereby also able to evaluate and understand why I as a general dentist had some success, but also why other cases failed. The important factor contributing to my success, at least in my mind, was first of all my genuine interest in factors related to patients' lack of coping with dental treatment. This made me an empathic listener who showed respect for the patient's problem with the ability to establish a trusting alliance. I gradually learned that the patient's problem had something to do with individual differences in perception of pain and lack of control, factors that today have comprehensive empirical support (Bergius et al. 1997; Law, Logan and Baron 1994; Litt 1996; Logan et al. 1991; Milgrom, Vignehsa and Weinstein 1992; Skaret et al. 1998; Vassend 1993). As a clinician I am still convinced that these factors are among the 'key' factors for successful prevention and treatment of anxiety. However, because of the complexity of anxiety and phobia the knowledge about purely these factors is not sufficient for a successful treatment outcome in phobia treatment.

A third step in my career as a dental phobia therapist started when I gained the opportunity to work with Lars-Göran Öst. He taught me how to practise cognitive behavioural therapy (CBT) in both multiple and one-session formats. I realized and learned how my treatment could be more effective. The main change in my treatment approach was that I learned to do effective exposure therapy. Three important factors in my approach were changed.

First of all I was no longer 'afraid' of the patient's high anxiety and, except for children, I stopped telling the patient to pause to avoid the increase in anxiety. When I did that earlier I confirmed the patient's dysfunctional thoughts about a possible catastrophe if the anxiety was too high. The gradual repetitive exposure under control teaches the patient that high anxiety is unpleasant but not dangerous.

The second important change was that I did not accept behaviour like closing the eyes, looking away and thinking about other things during the exposure. These safety behaviours represent escape from the situation and this is not effective exposure. Either the patient has learned by experience that it is helpful to try to 'escape', or the behaviour is introduced by the dentist. The patient can manage to do it under specific conditions and will establish well-anchored beliefs that this will not work if the safety behaviour is removed. This patient is not effectively treated for the phobia and will have coping problems when referred to another dentist. Other examples are further explained later in this chapter.

The third change in my approach was that I tried to talk less during exposure. When the rationale for CBT is explained to the patient the importance of the establishment of teamwork is emphasized. The therapist knows how to do the treatment, but the patient is the expert on his/her cognitions and emotions. The therapist should not tell the patient his opinion about the level of anxiety. The patient is concentrating on what happens in the body and needs time to do the 'work' himself, without being interrupted. Then the therapist should ask the patient about the thoughts and feelings during the gradual hierarchical exposure (see Chapter 9).

The description of the combined dental and anxiety treatment in this chapter is based on our CBT studies in patients fulfilling the criteria for specific phobia (dental phobia and intra-oral injection phobia, DSM-IV 300.29) (APA 1994) in one and five sessions, as delineated by Öst (see Chapter 9). The effects of CBT have been tested in many randomized controlled trials (RCT) and CBT is shown to be very effective for treatment of specific phobias (Öst 2008) (see Chapter 9), including dental phobia (Haukebo et al. 2008) and intra-oral injection phobia (Vika et al. 2009). However, the principles described for treatment of patients fulfilling the criteria for specific phobia will apply for any level of dental anxiety. The expression dental phobia (DP) will in this chapter therefore include the different levels of anxiety, independent of whether or not the DSM-IV criteria for specific phobia are fulfilled.

Characteristics of the Dental Treatment Situation

Compared to other specific phobias DP has specific characteristics that makes this phobia challenging. The dental patient has well-anchored beliefs about dental treatment as a situation for potential experiences of pain. The patient is lying down partially covered by the bodies of a dentist and the dental assistant. The mouth is filled with different instruments and the patient often has insufficient knowledge about why they are used and for how long they need to be there. These factors represent a risk of claustrophobic feelings. Patients try to behave in a polite way and want to contribute to avoid a delay in the dentist's busy schedule. The dentist's

non-verbal signals about the busy schedule make it difficult to express a possible feeling of being trapped. These different characteristics are all possible risk factors for feelings of lack of control and helplessness: potential risk factors for dental anxiety (Logan et al. 1991; Oosterink, De Jongh and Aartman 2009).

In contrast to patients with other phobias, dental phobics report painful dental experiences as a main aetiological factor (Lundgren, Berggren and Carlsson 2004; Milgrom et al. 1992; Skaret et al. 1998). The experience of pain is individual and subjective and influenced by the level of dental anxiety. The unpleasant bodily feelings experienced by a fearful patient may be reported as pain and the level of dental anxiety will influence both the anticipatory pain before treatment and the self-report of pain during treatment (Litt 1996). A typical potential risk situation is when the patient reports pain and the dentist concludes that the effect of the local anaesthesia (LA) should be reasonably good ('Your lip is numb, isn't it?'). Who knows the truth? Only the patient knows the truth. How can this situation be solved? The most important way to react is to show respect for the patient's pain report. Then the therapist should offer more LA (same injection or supplemental injections in the local area).

For the anxious patient who is saying:

P: I always feel pain even if I have an injection.

D: So you have experienced pain even if you had LA. I suggest that you come back another day. Then we will give you a strong 'pain killer' that you take one hour before your next appointment. Then we will give you LA again and test if the effect is better. Does that make sense to you?

P: Yes, I am glad you take my problem seriously.

The clinical experience is that this treatment is good. Why is the effect of the LA often very good at the next appointment? Because of the additional effect of the medication or because of the respect we showed the patient? Since the individual experience of pain is produced from the output of the brain, not from the sensory signal (Eli 2010), it could be one or the other or both.

Often the busy dentist is unaware of the patients' different non-verbal signals of anxiety and discomfort. This is often a question about insufficient knowledge of the normal and functional fear response. Of the three fear response components – the physiological (sympathetic activation), the cognitive evaluation (negative thoughts) and the behavioural response (escape or avoidance) – the first one starts even before the patient is aware of the fear-provoking stimuli (LeDoux 1998). This immediate response is functional and helps the patient to be aware of potential harmful situations that should be avoided. When the dentist is saying: 'Just relax, I'll be careful. This will go well' it will have a limited effect on the automatic physiological activation.

The Dentist as Therapist

The treatment approach presented here is based on our research model with cooperation between a clinical psychologist and a dentist. Psychologists have the competence for being phobia therapists, whereas dentists are licensed to perform dental treatment. To achieve cooperation, both participants need to acquire a new competence. The psychologist needs to have specific and rather detailed knowledge about the dental treatment situation, whereas the

dentist needs to be specially trained in CBT for DP, in addition to be generally experienced in clinical dentistry. In the model presented the psychologist performs the diagnostic interview and develops a plan for the *in vivo* treatment in cooperation with the dentist. The *in vivo* exposure to test catastrophic beliefs is carried out by the dentist. The general principle behind exposure *in vivo* is the hierarchical structure of tasks in the real situation. For the dental phobic the psychologist can only do part of the *in vivo* exposure and there is therefore a major advantage of using the dentist as the anxiety therapist for DP. Since the CBT is characterized by being relatively brief and time-limited, with a structured, directive and problem-oriented procedure, it is possible for a dentist to learn and follow the basic principles of CBT. The disadvantage with the dentist as therapist is the need for a resource-demanding course to obtain sufficient knowledge and training in CBT.

Changing the focus of the treatment

The general dentist has his/her main focus on the patient's dental treatment needs. To be a DP therapist implies an important change in focus from the dental treatment needs to the fear treatment, e.g. how and when to introduce dental procedures as part of the anxiety treatment. When a dentist without sufficient knowledge about anxiety treatment has a fearful patient in the dental chair, the focus on the dental work will soon bring the two of them into a situation where they are trying to do the dental work, even if the patient's behaviour and signals about lack of coping indicate that this will not be successful. The dentist is too soon trying to carry out the dental treatment, because that is the main focus, but also because he/she does not know how to handle the fear. The patient feels the pressure, is ashamed of being so 'stupid' and is struggling to cope with the situation. The result will often be a sort of adapted treatment ending up with temporary and low quality solutions. The criterion for success here is that the patient is able to cope with the temporary or adjusted dental treatment. The dentist needs more competence and training to be able to carry out a combined psychological and dental treatment where the criterion for success is a patient who is able to cope with ordinary dental treatment procedures, also in the future.

Safety behaviours

The fearful patient often carries out many different kinds of safety behaviours, like keeping the eyes closed, listening to music, having things done as quickly as possible (hoping to 'survive') and trying to 'hide' the negative automatic thoughts that pop up.

Sometimes the safety behaviour is introduced by the dentist. Let's take as an example a phobic patient whose catastrophic belief was being choked by the rubber dam clamp. The problem was 'solved' by having dental floss tied from the rubber dam clamp to his/her finger, in case the clamp should jump off the tooth and be stuck in the throat. This method will reinforce the patient's belief about the high risk that this may happen ('Since the dentist taught me to do this, the likelihood that the catastrophe will happen must be high').

Another well-known example is the patient who has experienced rapid increase in blood pressure (BP) and pulse rate caused by the adrenaline in the local anaesthesia (LA) solution when the injection accidentally ends up intravasally. This normal physiological response caused by the adrenaline may be misinterpreted as a sort of allergic reaction. When the patient tells a new dentist that 'I think I am allergic to LA', the response from the dentist, who is unsure

about how to respond and is focusing on the dental treatment needs, may be like this: 'Ok, but then we can give you another type of LA that your body will accept much easier' (not including adrenaline). The dentist has now reinforced the patient's belief about the allergy.

When the catastrophic beliefs are confirmed and never tested whether they are true or false, the patient believes that the treatment should only be carried out as long as the safety behaviour is maintained. He/she is still struggling with the anxiety, with a risk of future avoidance of care. Safety behaviour is functional as long as the patient is feeling the normal unpleasantness of the fear response and has experienced that e.g. listening to music reduces the unpleasant bodily feelings and increases the feeling of coping. This way of using distraction – altering the patient's attention from the negative thoughts to the music – is okay as long as the dental anxiety is not too high and the patient has no tendency of avoidance of dental care. For a patient with high dental anxiety, it is important that the dental treatment is put out of focus while sufficient time is spent on the exploration of the patient's level of anxiety and why it is difficult to cope with the treatment.

CBT in the Dental Chair

As for the CBT treatment of other phobias, the catastrophic belief that maintains the avoidance of treatment is an important focus for the gradual exposure. Gradual and repeated exposure for the most fear-provoking procedures is effective in the way that the beliefs about the catastrophe are tested in the real situation. The dentist's reassurance is not effective. For dental phobia, as for other phobias, the most effective way to get rid of the negative beliefs is by testing it repeatedly in the real situation. If the patient's catastrophic beliefs are completely removed, then the patient no longer has a phobia.

Establish mutual trust

The exposure is founded on teamwork between the patient and the therapist. In the model presented here the psychologist carries out the interview and has time to communicate and to establish rapport. Then the dentist is introduced to start the CBT. No person wants to try out procedures that are both anxiety provoking and potentially painful, without knowing that the therapist is trustworthy and will never do anything that the patient has not approved of. The establishment of a trusting relationship is fundamental to the exposure therapy and when the dentist starts the first session he/she also needs some time to establish a mutual trust in the team.

The establishment of the relationship between the patient and the therapist starts during the first few seconds when the dentist meets the patient in the waiting room. The basic principles in clinical communication, respect, emphatic response and active listening are key factors in the establishment of a trusting relationship (see Chapter 14). The establishment of trust during the start of the first part of the session does not necessarily need to be time consuming, since the establishment of trusting teamwork permeates the whole CBT session(s).

Patients with many years of avoidance of care feel shame, believe their oral health is a disaster and are afraid of judgement from the dentist (Berggren 1984). When the session starts this will be the focus of the patient: 'The dentist will be shocked when he/she looks in my mouth'. It is therefore important to start with having a look at the radiographs together. Taking an

orthopantomogram (OPG) before the session is most often acceptable to the phobic patient. The OPG gives an overview of the jaws, teeth and other anatomical structures intra and extra orally. The information based on the radiographs should be short and not detailed and the dentist should emphasize the positive aspects and conclude that the oral health status can be completely restored after the anxiety treatment is finished.

Then the team will go through the summary from the psychologist's interview. This gives the dentist the opportunity to confirm that he/she knows what the patient and the psychologist have emphasized as important regarding the anxiety treatment, and to show respect for the patient's previous experiences and that the avoidance of care makes sense based on the strong conviction of the catastrophe. Sometimes the catastrophic beliefs are not completely explored in the psychologist's interview, but will become clearer during the gradual exposure in the dental surgery.

The functional fear response

The therapist then starts to explain the nature of the fear response, the maintenance factors and the rationale for the treatment (see Chapter 9). The patient needs to understand that the unpleasant fear response is normal, functional and not harmful, and that the patient in that perspective is completely normal. Drawing the anxiety curve (see Chapter 9) and then using this as a reference during the exposure will help the patient to see how the anxiety is increasing each time a new step is introduced and to confirm how the fear will decrease during the repetitions.

Gradual exposure to the fear-provoking dental treatment procedures

When the treatment principles and the anxiety curve have been explained (see Chapter 9), then the exposure should start. Before the exposure the patient knows only one way to get rid of the unpleasant anxiety, namely avoidance or escape from the fear-provoking situation. Now the patient will experience that gradual exposure in a controlled way will decrease the anxiety across repetitions. The patient learns a new way of getting the anxiety under control. If the patient is saying 'no' to the next step the therapist will suggest a new one in between the one he/she has just suggested and the already completed step. The patient is asked to rate the level of anxiety at different steps of the procedure. This will confirm that the anxiety really is decreasing by doing the repetitions. The therapist should remind the patient about the important principle that nothing will be done without having verbal or non-verbal acceptance from the patient, but also that the more the patient is 'saying' yes, the more effective the anxiety treatment will be.

Catastrophic beliefs in the dental situation

Some examples of catastrophic beliefs reported by patients with DP are:

- After the LA injection my tongue swells and fills my throat completely (I will be choked)
- My jaw will fracture during a tooth extraction and I will have permanent injury
- Injection in my mouth makes my head anaesthetized
- The pain will be so strong that I will panic and force my way out of the dentist's office
- The needle fractures and the end of it will move inside my body and end up in my heart or lungs

- The needle will get stuck in the jawbone
- I will faint and never wake up again
- I will faint and lose some of my memory
- The dentist will turn crazy

There will often be several procedures that make the patient fearful. Focusing on the catastrophic beliefs makes the treatment more effective. Exposure to things that the patient is not so afraid of is a waste of time. You can do some exposure to minor fear-provoking procedures later, if necessary. When the patient is able to cope with the most anxiety-provoking procedure, then the rest will often be easy. Flexibility is important for the progress of the exposure. The therapist needs to be creative and come up with new steps when the patient is hesitating to the proposal for the next step in the hierarchy.

Generally it is a good idea to start the exposure by looking in the mouth. Since you have looked at the radiographs, it is easier for the patient to let you have a look in the mouth. When opening the mouth gives strong fear activation, then we follow the procedure for gradual exposure under control. Making steps with time structuring, e.g. only looking for 5 seconds, doing repetitions and then looking until the patient raises his/her hand is one way of making the hierarchy. The dental mirror is introduced as an instrument that makes it easier for the dentist to see the teeth in the upper jaw. One should be careful when introducing the probe. This instrument is usually rated high on the fear hierarchy for patients with DP. Probably this is because the probe is used to examine the areas where the teeth are sensitive (e.g. the cervical area). Dentists also have a tendency to further confirm the diagnosis of caries by pressing the probe into the cavity already diagnosed. In addition the fearful patient may experience that the dentist is saying something like: 'I will only do a dental examination'. This is the same as saying: 'You have no reason for interrupting me while I am doing the examination'. The patient is 'waiting' for the unpredictable pain experience from the probe and has the feeling of no control. The oral examination should start by letting the patient hold the probe in his/her hand, while giving an explanation of the function of the instrument, and encouraging the patient to give a signal if the probe hits a sensitive area. This is an appropriate time to introduce a hand mirror, which gives the patient the opportunity to see how the dentist is holding his/her fingers and the probe when doing the dental examination. While the patient is looking in a mirror is ideal timing for confirming the brief overview of the dental treatment needs that the team found when looking at the OPG. Again the dentist should emphasize the positive aspects and avoid detailed descriptions of the different treatment needs. Here the suction, the air and water blower can be introduced and practised. A brief dental examination is also a good situation to practise the patient's control by raising his/her arm. The patient looks in the mirror when the probe touches a tooth or a filling and raises his/her hand if necessary. It is important to actively involve the patients in these demonstrations and encourage them to ask questions. The further gradual exposure now focuses on the part of the treatment that the patient is most afraid of.

Intra-Oral Injection Phobia

To avoid gradual exposure with steps that are not activating the fear response, it is often useful to start with a step that one can guess may not be accepted. For a patient afraid of the pain of the injection the suggestion could be: 'Would it be OK for you if I hold the syringe in your

mouth and carefully touch the mucosa with the needle?’ Probably the needle phobic afraid of the pain would say ‘no’, whereas a patient afraid of what will happen when the anaesthetic solution enters the body may say: ‘OK, but only if the syringe is empty’. This will guide the dentist in finding the best step to start with. If they have decided that the first step should be to put the syringe on the table, then time structuring is helpful: ‘Is it OK to have the syringe on the table for 5 seconds and then take it away? Then, when you are ready I will put it there again for another 5 seconds’ or: ‘Is it OK that the syringe is on the table until you raise your hand? – Remember, you have to look at it’. This gives the patient control and new knowledge: the anxiety is decreasing without escape.

Topical anaesthetic

When should the topical be introduced? As shown in Table 10.1, topical anaesthesia is introduced late in the hierarchy. The topical should not be introduced too early. The therapist may need to have extra steps in his/her ‘pocket’ to introduce and put in between, to help the patient overcome steps like perforation of the mucosa. Two good steps to have here are the topical anaesthesia and the ‘minimal’ perforation. When the patient has managed the perforation of the mucosa several times in one area, the suggestion should be:

Since you are able to manage the needle perforating the mucosa, my suggestion is that we should do the same in an area without topical on. Why? If you have not tested the injection without having the topical anaesthesia on, you may think: I can do this, but only if I have the topical on. You need to test and experience that the pain signals with and without topical are not very different. Even if I tell you that, your beliefs will only change if you test it.

When the catastrophic belief of a patient with intra-oral injection phobia is: ‘I will die when the liquid enters my body’, then the steps and where to start may be quite different. How strong are these beliefs and what are the reasons for having them? It makes sense that the patient is not willing to have LA if he/she is convinced that there is a high risk of dying. The therapist has to explore the patient’s catastrophic beliefs: ‘Imagine you are in a situation where a dentist is giving you an LA injection. How convinced are you (0–100 per cent) that it will lead to your death?’ The patient will often give a very high score. ‘How convinced are you now when you are sitting here talking rationally to me about it?’ The score will be much lower. ‘Have you heard about situations where a patient died because of LA?’ Patients afraid of a catastrophe are often not aware that the unpleasant feelings in the body are a normal fear activation. The use of a digital instrument measuring blood pressure (BP) may be helpful to show an increase in BP when you also perforate the mucosa without having the liquid carpule in the syringe. This may help the patient to understand that the unpleasant bodily feeling is fear activation. In these cases the topical anaesthesia is also a helpful step to use before the injection of a small drop of LA. The feeling of numbness activates the fear response, but the patient will experience that nothing else happens.

As shown in Table 10.1, the steps often start by showing the different components of the LA equipment (Step 1). The patient will guide the dentist further by saying yes or no to his/her proposals. ‘What do you think will happen if I put the end of the needle in your mouth with the cap on?’ Suggest either counting to five or more or keeping it there until the patient gives a sign (e.g. raising hand) (Step 2). Remind the patient that it is more effective to try to stay in the

Table 10.1 Examples of exposure steps for intra-oral injection phobia (fear of pain)*.**Intra-oral injection-phobia****Fear of pain**

- 1 **Show the syringe with carpule and needle installed (cap on)**
 - 1.1 Show only the syringe
 - 1.2 Show syringe, carpules and needles (not installed)
 - 1.3 Install carpule and needle to syringe (explain)
- 2 **Syringe with carpule and needle. Needle in the mouth (cap on)**
 - 2.1 Syringe with needle (cap on) outside the mouth – long distance
 - 2.2 Syringe with needle (cap on) outside the mouth – gradually shorter distances
 - 2.3 Introduce the hand mirror to the patient
- 3 **Needle in the mouth (cap off).** The patient is looking in the mirror
 - 3.1 Syringe with needle (cap off) outside the mouth – long distance
 - 3.2 Syringe with needle (cap off) outside the mouth – gradually shorter distances
- 4 **Needle touching the mucosa in the mouth**
 - 4.1 Needle touching a finger
 - 4.2 Needle touching the lip
 - 4.3 Needle touching mucosa in the mouth
5. **Perforating the mucosa without injection of LA**
 - 5.1 Topical anaesthesia
 - 5.2 Minor perforation of the mucosa (only needle point) (A pain signal is sent)
- 6 **Minor injection of LA**
- 7 **Gradual injection of more LA under control**
The patient gives a stop signal

Note: * 1–7 are the major steps. The minor steps in between are used when the patient will not accept the next major step.

situation (the fear will first increase, then decrease slowly). When the patient has experienced a moderate decrease in the anxiety by doing the repetitions then it is time to suggest another step: ‘What do you think will happen if we do the same steps without the cap on?’ Then the same steps are repeated without the cap on (Step 3). It’s time to touch the mucosa or lip with the needle (Step 4): ‘Is it OK to touch the mucosa with the point of the needle?’ Then a minor perforation of the mucosa, without injection of liquid?’ If the patient is afraid of the pain, then this is the time to introduce the topical anaesthesia. After the small perforation, the dentist asks: ‘How was the pain?’ and ‘How was the anxiety?’ The session should never be ended by testing a new step if there is not enough time left for repetitions. Each time a new step is introduced the anxiety will increase, but after the repetitions the anxiety is low, giving a good feeling of coping.

The pain cells

The following is one way of explaining the pain signal:

When touched by the needle the pain cells in the thin surface of the mucosa send out one signal to the brain. If you do perforations you will often touch a pain cell. The cell will send a signal when coming into contact with the needle. This is like sending an email, and as you know, when you click on the *send* button, only one email will be sent.

Looking in a mirror

Exposure treatment does not include safety behaviours: closing the eyes and looking away is not allowed. In the first part of the exposure, the patient is able to watch the procedure, but when the steps are taking place near or inside the mouth, it is time to introduce the hand mirror. Some patients will hesitate, but this is because they are used to the safety behaviours. However, when they start looking in the mirror, they will soon feel the aspect of control by looking. Patients with a high desire of control coupled with low perceived control (Law et al. 1994) may even choose to watch the needle touching the mucosa or even look when the needle is perforating the membrane.

End of the exposure

The important principle of overexposure (see Chapter 9) is easy to follow for these patients by performing multiple injections in different areas of the mouth, to ensure that patients are convinced that the catastrophic beliefs are imaginary. Near the end of the one-session treatment or the last session in a multiple session treatment, it is time for the question: 'Is there any place in the mouth you cannot have an injection?' Remember, the patient has the control, but it makes sense for him/her when the therapist suggests: 'To get rid of the phobia it is a good idea for you to test as much as possible while you are here in a skilled and trustworthy team'.

Patients with Blood-Injury-Injection (BII) Phobia

Some forms of intra-oral injection phobia are part of BII phobia, one possible biological conditional phobia with onset in childhood, which occurs relatively frequently (see Chapter 5). These patients experience an atypical physiological response (Öst 1987) that is different from all other phobias; characterized by a feeling of dizziness and a tendency of fainting caused by a sudden decrease in BP. It is necessary first to explain what happens when someone faints: a biologically based and functional response that patients experience as unpleasant bodily feelings (e.g. nausea, dizziness). Those affected tend to avoid procedures that involve injections, operative procedures and sight of blood (see Chapter 5). If the patient reports these experiences he/she should learn how to compensate for the decrease in BP by using the tension technique (Öst and Sterner 1987). This is used for patients with symptoms of BII phobia and who experience major discomfort with fainting or near fainting when exposed to BII stimuli. The technique has two objectives: (i) to teach the patient to recognize the first symptoms of the decrease in BP and (ii) to apply a tension technique to compensate for the drop and stimulate an increase in BP. The patient is instructed to tense the big muscle groups in the arms, chest and legs for 15–20 seconds until they can feel the heat rising in the face. Then the patient releases the tension and goes back to the original level (not relaxing). The tension is repeated five times and the entire sequence takes no more than five minutes. A digital BP instrument attached to the upper arm can show how the BP is increased and thereby confirms the experience of being able to compensate for the BP fall in situations with a tendency to faint. The patient is recommended to practise the tension technique five times each day at home.

The exposure process will be as for other needle phobic patients, except for doing the muscle tension every time the symptom of a drop in BP starts. One BII phobia patient described the situation like this:

When the first symptoms of fainting start, it feels like a white cover is coming from behind and covering my head and then gradually also my eyes and face until everything turns black. When I get the symptoms and then immediately start doing the tension technique, it feels like the white cover is stopping on top of my head. Instead of covering my eyes it then starts going back again.

Patients Afraid of Drilling

Patients who are afraid of drilling often have experienced insufficient effect of LA and have strong beliefs about sudden and intolerable pain. After these experiences they will be in a constant stress each time they are in the same situation. This is a situation where the pain signal is unpredictable, accompanied by a feeling of lack of control. Catastrophic thoughts may be to panic and to behave in a way that may be harmful to the dental personnel.

One reasonable way to start is by doing a demonstration of the different instruments that will be used: air and water blow and suction. During exposure the therapist continuously describes what he/she is doing. This is now much easier since the instruments were introduced at the beginning of the session. Some patients may like the idea of holding the minor suction in their own hand and then using it when they feel the need to remove water/saliva. This increases the feeling of control. During exposure the patient will accept the usual way of using it: the suction stays in the mouth, but the patient should be encouraged to change the position of it, or take it out temporarily if necessary.

As shown in Table 10.2, the exposure should follow a hierarchy from listening to the sound of the drills to touching the tooth or a filling. The dentist selects a tooth that needs a filling. When having reached the step where the patient manages to touch the tooth or filling, then it is time to give LA. If the patient is also afraid of the injection, there is also a need for exposure to this procedure.

Testing the effect of the LA

The patient's worry is whether or not there is sufficient effect of the LA and he/she is now in the situation where the catastrophic beliefs can be tested. An electric pulp tester is a helpful instrument and in these cases the pulp test should be used both before and after the LA is given. The dentist explains the rationale for doing this and explains and shows (patient is looking in the mirror) how the instrument works. The patient is given the opportunity to remove the instrument when the electrical signal arrives (control). It then makes sense for the patient that the same test is repeated again after the LA has been given, to test if the pain signal is missing. The therapist explains that the lack of response from the tooth indicates that it is anaesthetized, but neither the dentist nor the patient knows if the effect is 100 per cent. However, if there are still pain signals they should be low and tolerable. To test if the effect is sufficient, the team will continue to work together and test it gradually in small steps (see Table 10.2) by time structuring. The drilling will last for a few seconds (e.g. counting to five) and then the time may be increased gradually until the drilling can be done in the usual way.

Table 10.2 Examples of exposure steps for dental phobia (fear of pain)*.**Dental phobia****Fear of painful drilling**

- 1 Show and explain the micro motor, high speed and foot controller**
 - 1.1 Patient holds the motor
 - 1.2 Show different burs
 - 1.3 Touch the nail with the bur
- 2 Listen to micro motor/air turbine outside the mouth.** Time structuring
 - 2.1 Listen to micro motor/air turbine outside the mouth – long distance
 - 2.2 Listen to micro motor/air turbine outside the mouth – gradually shorter distances
- 3 Listen to motor/handpiece with bur inside the mouth**
 - 3.1 Patient looks in the mirror and gives stop signals
 - 3.2 Motor/handpiece with bur outside the mouth with mouth closed. Time structuring
 - 3.3 Motor/handpiece with bur outside open mouth – long distance
 - 3.4 Motor/handpiece with bur outside open mouth – gradually shorter distances
- 4 Bur touching a tooth/filling.** Time structuring
 - 4.1 Rubber cup touching nail or finger
 - 4.2 Rubber cup touching a tooth/filling
- 5 Local anaesthesia** (exposure to the injection if necessary – see Table 10.1)
- 6 Drilling of a small cavity under control.** The patient gives a stop signal
 - 6.1 Drilling of a small cavity. Time structuring – gradually increasing number of seconds

Notes: * 1–6 are the major steps. The minor steps in between are used when the patient will not accept the next major step.

The patient will raise his/her hand as a stop signal if pain is experienced. The dentist now gradually drills the cavity. Even if an insufficient amount of LA is given, it is a good situation for the patient to experience moderate pain during drilling. Then the catastrophic belief will be tested. If the patient stops and reports pain, he/she can be given options like: (i) have more LA or (ii) do a small test again to evaluate if the pain is tolerable. The last option is introduced only in a situation where the drilling is almost finished. This confirms the agreement about the two experts in the team, where the patient is the expert on his/her own emotions and cognitions (see Chapter 9).

The dentist also explains the different equipment for making a filling. For some patients the procedure of filling of the cavity is experienced as being trapped. Often this is because they have beliefs that something may be ‘destroyed’ if the procedure is interrupted. Explaining, or in some cases even demonstrating, that it is okay to stop the procedure and start again is more effective than just saying that it is okay. The demonstration will confirm that no catastrophe will happen.

Patients Afraid of Extractions

The important CBT principle about the repetitions of the hierarchical steps during exposure is difficult for some dental procedures. There has to be sufficient treatment needs. One example is dental extraction. In these cases the negative beliefs are often painful treatment and/or a painful postoperative period. Examples of catastrophic beliefs are fracturing of the

tooth or even the jaw, post-surgical pain that will end up as chronic pain, a serious infection or bleeding that will not stop. These patients should be guided through one or more extractions to test the negative beliefs. This is only possible if there are several teeth or roots that need to be removed. If there is more than one option, the patient may have negative thoughts that are connected to one specific tooth. Often this is a tooth that has been painful. The most effective exposure will be to remove this specific tooth. However, if there is no need for extractions, the focus will be on reconstructing the negative thoughts by giving the patient new knowledge about the anatomy, how the extractions are performed, including thorough information (tell and show) to reduce the conviction of the beliefs. Dependent upon what the patient is afraid of, this information may be e.g. how the teeth are anchored to the bone, how it is possible to test if the local anaesthesia has sufficient effect, how the instruments are working, and so on. Looking at X-rays and inside the mouth (mirror) and also demonstrating by use of artificial anatomic models will help obtain new knowledge.

The exposure steps for an extraction will be to teach patients the difference between pain and pressure and then how the effect of the LA can be tested by using an elevator to demonstrate the feeling of pressure when the tooth is luxated. Time structuring or the patient raising his/her hand for a temporary stop ensures the patient's feeling of control. The patient will learn to differentiate between experiences of pain vs. pressure.

Patients Afraid of Endodontic Treatment

Patients afraid of endodontic treatment often report catastrophic beliefs based on experiences of root canal treatment with insufficient effect of local anaesthesia and negative thoughts about breathing problems and feelings of being choked because of the rubber dam. This is again an example of insufficient information about the pros and cons of using the dam and how it is possible to remove it (also during treatment). The patient is often told that the rubber dam is mandatory and has the belief that removing it may 'destroy' the treatment (something serious will happen). It is possible to change the position of the rubber dam in a way that gives the patient access to the oral cavity with a saliva suction. To have the opportunity to control the level of saliva and to understand how the rubber dam is preventing water from going into the throat helps the patient to feel in control. Generally the exposure treatment for endodontic procedures is introduced in steps as for other dental procedures. The patient should be encouraged to follow the procedures using a mirror.

Patients with Gagging Problems

The gag reflex is a normal and functional mechanism protecting the trachea, pharynx and larynx from the entrance of foreign bodies. When intra-oral stimulation occurs the afferent signals are sent to the brain and followed by efferent signals that start the spasmodic and uncoordinated muscle movement: the gagging (Andrews and Widdicombe 1993). However, some people have a pronounced gag reflex that may compromise many aspects of dental treatment, from diagnostic procedures like oral examination and X-rays to active dental treatment procedures (Dickinson and Fiske 2005). A review article (Bassi, Humphris and Longman 2004) describes the multifactorial aetiology of severe gagging with associated factors, e.g. anatomical and iatrogenic

factors, systemic disorders and psychological conditions (learned responses). The review also gives an overview of different management strategies including behavioural techniques.

A patient with severe gagging problems often shows some of the typical emotions and behaviours of the fearful patient, e.g. feelings of shame, avoidance of dental care or seeking care only for acute treatment (Milgrom, Weinstein and Heaton 2009). When assessment of the patient's problem shows that the disruptive gagging problem first of all occurs in the dental chair, then it should be presented and explained to the patient as a behavioural response – a learned response that can be relearned (Ramsay et al. 1987). These patients often have negative dental experiences with the gagging based on classical conditioning. Some of these patients may even experience gagging when thinking about dental treatment. The reflex has 'learned' to be elicited too early ('just in case'). However, gagging patients do not often report high fear scores. They usually explain the problem as: 'I have always been like this and my mother had the same problem'. The patients have beliefs about being born with a kind of 'defect' that cannot be treated. The gagging patient may have thoughts like: 'I will start gagging again and then the treatment has to stop', or 'I may start vomiting and something will go wrong because the treatment has not finished yet'. 'The dentist will see me as being foolish'. Focus is on establishing a trusting relationship, giving information about the normal and protective fear response and challenging and reconstructing the negative beliefs about the consequences of the gagging. The focus of the treatment should therefore be to reduce the anxiety and to 'teach' the reflex not to start without a normal stimulus.

A gagging patient needs a clinician who is prepared to invest time and show respect and interest in the patient's problem. The team should do a thorough assessment attempting to identify the specific situations that are triggering the gagging reflex (both at home and in the dental setting) (Bassi et al. 2004; Milgrom, Weinstein and Heaton 2009).

At the moment the gagging starts, the patient is either holding the breath or starting to hyperventilate (Barsby 1997). So, for the gagging patient, relaxation and breathing techniques are helpful during the exposure treatment (Barsby 1997; Milgrom, Weinstein and Heaton 2009). Homework like practising gradual exposure while focusing on normal breathing should be part of the treatment plan. Other examples are keeping the X-ray in the mouth and following the principles of gradual time-structured exposure, starting with the front area and then gradually making hierarchical steps further back in the mouth. Instead of thinking negative thoughts, e.g. 'I will start gagging again', the patient should learn to focus on positive thoughts like: 'I know I can give a signal and have a break if the feeling of gagging is coming. I will focus on the breathing and I have already experienced that the gag reflex is not as active as it used to be'.

Since the disruptive gag reflex is often a manifestation of anxiety, a reduction of the anxiety activation is a reasonable way to reduce the problem. In situations with urgent need for dental treatment, initial use of sedation may help the patient to cope with the acute treatment. Then the behavioural approach to achieve a long-term solution can start.

Coping with Future Dental Treatment

At the end of the CBT session(s) the patient is often euphoric and looks upon what has happened as unbelievable. Then the question almost always is: 'I can manage the treatment when we work together, but what will happen when I come to an external ("ordinary") dentist?' The answer is as follows:

During this treatment you have learned a lot about dental treatment, about how things work and about the anatomy in your mouth and jaws. You have new knowledge about why certain things cannot happen. Do you think you will forget this knowledge within a couple of weeks, when you visit the new dentist? How you want your dental treatment to be done is written down in my referral and you have your own copy with you. Whether or not you control the situation the way we have learned is your responsibility. I cannot go with you, but I can ‘sit on your shoulder’ and whisper into your ear: remember what we talked about! You are not phobic any more, but in a way this is like taking a driver’s license. You have to start practising to be a good driver.

When the patient is referred to a general dentist for further dental treatment it is valuable for both the dentist and the patient that the therapist writes a summary of the anxiety treatment emphasizing the catastrophic beliefs, the exposure treatment and what will be important for the patient during future dental treatment. One example is shown here:

Patient NN born..... was referred to our clinic (date). He had avoided dental care for x years because of dental anxiety. He had experienced LA as very painful and also had experiences with fainting just after the LA injection. He also has memories of painful drilling because of insufficient effect of the LA. His catastrophic beliefs were: (1) risk of having permanent reduction of memory after fainting and (2) sudden strong and stinging pain during drilling. The patient was treated with CBT (one session lasting for three hours) with focus on exposure for LA including use of tension techniques to compensate for the fall in BP.

The patient responded well to the treatment. In total 14 injections were given, including five ‘minor’ injections (only the tip of the needle perforating the mucosa). The last four injections were with LA solution (totally 1 and 1/4 carpules).

NN wants to have a small injection of LA first. When he is ready the rest of the injection can be injected gradually. He will use tension techniques when he finds it necessary. He sometimes prefers to have a hand mirror to be able to follow the treatment. He gives a signal with his left hand if he wants to have a break. When the drilling starts he prefers some time structuring to verify that the LA has good effect.

When Does the Psychologist Need to be There?

The disadvantage of focusing on the difference between a patient with high dental anxiety and a patient fulfilling the criteria for specific phobia is that dentists may hesitate when somebody refers a ‘phobic’ patient to them. The word ‘phobic’ or patient with ‘odontophobia’ is often used uncritically and is not based on a proper diagnostic evaluation.

In CBT there is not much focus on the aetiology of the dental anxiety. Clinical research has shown that CBT works more or less independent of what onset circumstance there is for the individual patient (Öst 1985). Thus, the focus is on challenging the negative thoughts and the strength of the negative beliefs that maintains the avoidance behaviour (see Chapter 9). Reconstructing the beliefs about possible catastrophe is the key for making the patient willing to undergo exposure treatment in order to prevent avoidance behaviour. The low focus on the aetiology makes it easier for the dentist to perform CBT therapy. However, the anxiety treatment is most effective if the treatment focuses on the patient’s primary diagnosis. This means that the dentist trained in CBT can carry out effective anxiety treatment of patients with DP as the

primary psychological diagnosis. Patients with additional severe problems should be evaluated by the psychologist or the psychiatrist. The ideal situation is that a dentist with competence in CBT of DP works in a team alongside a psychologist.

A dentist who knows the principles and has clinical experience with CBT should welcome all patients who are willing to talk to a dentist about their dental anxiety problem. However, dentists working with patients with high dental anxiety should establish contact with a local CBT-trained psychologist. They will then have the opportunity to refer the patient for an assessment and a diagnostic interview. Indications for this may be when a patient reports specific previous experiences as the reason for the avoidance behaviour, e.g. sexual abuse, torture or other obvious reasons that clearly indicate that the avoidance of dental care is a part of a larger problem, with other psychiatric disorders as the patient's primary problem. When another psychological disorder is the primary problem, the patient needs to be evaluated and often treated for this primary disorder by a psychologist. The need for professional psychological assessment may be for reasons such as:

- Possible comorbidity, with other disorders than DP as the primary diagnosis
- Experiences of serious traumas that may be reactivated by the dental exposure
- Insurance systems where free dental care is given to patients with specific psychiatric disorders

A plan for the CBT to help the patient cope with dental treatment should in these cases be done as team between the psychologist and the dentist. When a dentist with competence in CBT in dentistry has a new patient with behaviour management problems, the behaviour problem will be the main focus. The primary goal for this dentist will be to enable the patient to cope with future dental treatment. However, the first assessment will involve the following questions:

- Is there a mismatch between the dental treatment needs and the patient's ability to cope?
- Is there no need for acute treatment?
- Can the dental treatment needs be postponed?

If the answer is yes to these questions the focus should be on the coping problem:

- What is the patient most afraid of?
- What are the dysfunctional thoughts that maintain the avoidance?
- Is the patient motivated for phobia treatment?

Conclusions

As shown in the randomized clinical trials, both five- and one-session treatments are effective for patients with DP or BII phobia (Haukebo et al. 2008; Vika et al. 2009). Why are they both effective in the dental setting? When the treatment is performed in multiple sessions, each new session has to start with repetitions of the last steps from the previous session. The anticipatory anxiety will still be there at the start of every new session and some repetitions are necessary to reach the level of anxiety from the previous session. Even though the repetitions in the next

session show faster decrease in the anxiety, it takes time and knowing that there will be further opportunities makes it easier to stop and postpone further exposure until the next session.

The conclusion is that the one-session treatment (OST) is also suitable for dental phobia and anxiety. The treatment will be effective as long as the catastrophic beliefs have been tested and disconfirmed, whether this is done in one or in several sessions. The number of sessions does not necessarily have to be five. In cases with possible comorbidity, with other disorders than DP as the primary diagnosis, the psychologist will need a number of sessions to evaluate and make a treatment plan together with the dentist. In multiple session treatment some patients may prefer to try sessions that last for more than an hour. This is one way to gradually gain experience of how to work in longer sessions. However, to perform CBT in patients fulfilling the criteria for DP during one session can be assumed as particularly challenging. The dentist needs to be very experienced both in clinical dentistry and in CBT. Based on my clinical experience I would recommend that the dentist should first learn and practise doing multiple session treatment. Training and experience make it easier to do the OST later on. However, dentists will not be able to learn CBT properly without qualified supervisors. Offering therapy to phobic patients without having the sufficient competence is unethical.

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Dental Treatment under Sedation

Magne Raadal

Introduction

Sedation is defined as a medically controlled state of depressed consciousness. The term *conscious sedation* implies that the patient is awake and able to respond to verbal and physical stimulation. The protective reflexes are maintained and the patient retains a patent airway independently and continuously. The term *deep sedation* denotes a deeper state of depressed consciousness from which the patient is not easily aroused, but is still maintaining protective reflexes even if they are reduced. *General anaesthesia* is an even deeper state in which the patient is fully unconscious. Sedation and general anaesthesia may be obtained by the same drugs, as the level of depressed consciousness is dependent upon the dose of the drug.

There are a number of publications that present guidelines for oral health professionals about the use of sedatives and general anaesthesia (Glassman 2009). Most of these suggest that only *conscious sedation* should be administered by a dental practitioner working alone (Department of Health 2003; Norwegian Medicines Agency 2003; The Royal College of Anaesthetists 2007) since treatment procedures in the oral cavity take place in close proximity to the airways. Deep sedation and general anaesthesia are accompanied with risks of having fluids and foreign bodies slip into the airways, since the protective reflexes are partially or totally lost. These procedures should therefore be administered by an anaesthetist assisting the dentist during treatment.

Pain and Pain Control

Pain is closely related to dental anxiety and phobia since a majority of patients report painful stimuli during dental procedures (procedural pain) as one of the most important reasons for their anxiety (Locker, Shapiro and Liddell 1996). Pain is defined as an unpleasant sensory and

emotional experience associated with actual or potential tissue damage, or described in terms of such damage (International Association for the Study of Pain 2011). It is always subjective and each individual learns the meaning of the word through their experiences related to injury in early life.

Tissue damage is the most obvious painful stimuli during a dental procedure and this is most easily prevented by the use of local analgesia. However, there are a number of additional factors known to affect the individual perception of pain, such as classical conditioning, peripheral and central sensitization, biological variations, previous pain experience, context and a variety of psychological factors (Melzack 1999). A typical example in dentistry is the very anxious patient who perceives a gentle touch of the explorer on the top of a tooth and the sound of the drill as painful.

Prevention of painful dental treatment must therefore be based on a combination of psychological and pharmaceutical interventions. Before the choice of the possible use of local analgesia, analgesics, sedatives and other drugs, it must be decided in which psychological context these tools should be applied. Cognitive behaviour therapy (CBT) of phobic patients therefore must include these aspects.

Indications for Sedation and General Anaesthesia

Even if some dentists see sedation and general anaesthesia as alternatives to psychological treatment of patients with dental anxiety and phobia, the purpose of this chapter is to describe them as supplements. The main reason for this is that the objective of this book is the long-term goal of treating patients with dental phobia and the primary intention is therefore to treat the anxiety disorder, which in turn will make the patient able to cope with necessary dental treatment. Sedation and general anaesthesia alone may be excellent tools in cases where the dental treatment need is the primary goal (Jackson and Johnson 2002), e.g. in emergency cases, but their effectiveness in reducing the dental anxiety is small or totally absent (Berggren 1986; Hakeberg et al. 1993).

Conscious sedation implies that the patient is awake and capable of communicating with the dentist and usually the patient is able to recall what has been going on during the session. Since the anxiety and tension are reduced, communication with the therapist may be facilitated. This is the key factor in order to understand the potential of using conscious sedation as an adjunct to psychological interventions.

There are two main indications for use of conscious sedation in this setting:

- Before dental treatment: prevention of anticipatory anxiety.
- During dental treatment: as supplement to psychological techniques during exposure to anxiety-provoking dental procedures.

Prevention of anticipatory anxiety

Avoidance behaviour is typical for patients with dental anxiety and phobia and they frequently cancel dental appointments (Skaret et al. 1999). Even if their intention for showing up is sincere, their anticipatory anxiety and catastrophic thoughts increase as the time of appointment approaches, frequently after a sleepless night. A sedative with anxiolytic and hypnotic

properties may be a tool for such patients in helping them to a good night's sleep and reducing their anticipatory anxiety, thereby facilitating their intention of keeping the appointment and making them available for psychological treatment.

Conscious sedation during treatment

As previously stated sedation may be effective in helping anxious patients cope with dental treatment (Jackson and Johnson 2002). However, it is also the experience that conscious sedation in dentistry does not work for patients with high dental anxiety or phobia and many of them are not even willing to try it. One reason seems to be the fact that these patients usually have a strong feeling of lack of control in the dental chair and the prospect of being sedated increases this feeling. And, since conscious sedation implies that they are awake, their catastrophic thoughts are maintained. These facts limit the indications for conscious sedation as an adjunct to the psychological techniques in which the primary goal is treating the anxiety disorder.

Generally it is suggested that sedation is used for two main purposes in connection with CBT of phobic patients:

- After having established a good relationship between patient and therapist and the patient is confident with being sedated, conscious sedation during exposure to the most frightening stimuli may result in easier and quicker acceptance of the stimuli. This assumes a dose of the drug that enables the patient to communicate well and perceive the outcome of the treatment. The drug must not have an amnesic effect so that the patient is able to remember his newly acquired coping skill. This approach is mostly indicated when CBT is performed *in vivo* by a dentist as therapist and where the anxiety treatment and dental treatment are performed simultaneously.
- When the CBT has resulted in good acceptance of the most general dental treatment modes, but there are still certain procedures that the patient perceives as extremely demanding, sedation may be a choice to facilitate coping with these particular procedures. A prerequisite is that the patient is confident with being sedated and finds it helpful.

Deep sedation during treatment

Deep sedation is an anaesthetic state very close to general anaesthesia, since the patients are more or less asleep and the protective reflexes are reduced. The indications for deep sedation in combination with CBT may therefore be similar as for general anaesthesia (see below).

The main indication may be emergency cases when dental treatment must be performed in patients lacking the ability to cooperate during this treatment. Since the protective reflexes are reduced, particularly the patient's ability to cough if foreign bodies enter the larynx, the challenge for the operating dentist is to secure the airways during treatment. Use of a rubber dam is a good preventive measure during general operative dental treatment. In cases of surgical treatment the operator should be extremely careful in preventing blood, tooth fragments, surgical gauze and other elements slip into the throat of the patients.

Deep sedation may be acquired by use of the same medications as for conscious sedation, but with higher doses. Depending on the type of drug and route of administration, the level

of sedation is more or less easy to control. Intravenous sedation and inhalation sedation are most easily controlled since the drug may be titrated slowly with almost immediate dose response. The individual responses to drugs given by the oral, nasal and rectal routes are much more unforeseeable and there may be situations when the dentist is faced with cases where the level of sedation is deeper than expected. If this happens and dental treatment proceeds, a major focus must be kept on preventing aspiration of foreign bodies from the oral cavity.

Indications for general anaesthesia (GA)

Patients with dental phobia often request dental treatment under general anaesthesia, which they consider to be a feasible way of having their dental problems solved. Even if this is effective in completing dental operative procedures, it is well known that there is no or limited effect on the dental anxiety disorder (Berggren 1986; Hakeberg et al. 1993). It is also our experience that if such patients are offered treatment under general anaesthesia before any psychological treatment of their phobia, they may not come back for such treatment after the GA. Their relief at having their dental problems fixed reduces their motivation for anxiety treatment and their avoidance behaviour is maintained. There is therefore a high risk that the main problem, namely the anxiety disorder, will result in further dental neglect and more oral diseases in the future.

Based on these considerations and experience at the Center for Odontophobia, University of Bergen, there are two alternative ways to successfully combine CBT and GA in treatment of phobic patients who request dental treatment under GA:

1. *GA before CBT*: In cases with large and complicated dental treatment needs, including multiple open cavities and possible infections in the jaw, an initial GA session may be used to treat the most severe dental requirements. It is important that the treatment is perceived by the patient as initial and temporary, aiming at pain relief and elimination of possible infectious diseases, so that likelihood for attending CBT is maintained. When the CBT is then combined with dental treatment, adapted to the patient's ability to cope (see Chapter 10), this will increase the likelihood for the therapist to continue with no or little dental pain since large open cavities and infectious swellings have been eliminated.
2. *GA after CBT*: This should be preferred in cases where it is possible to accomplish the CBT in combination with non-painful dental treatment. This is mostly the case in patients with less severe oral diseases without large and complicated treatment needs and acute pain. After the anxiety disorder is brought under control and the patient is able to cope with ordinary dental treatment procedures, a GA session may be very useful in completing the most challenging dental procedures, e.g. complicated surgery, instead of subjecting the patient to potential procedures that may result in anxiety relapse.

Special considerations for child patients

Children more frequently than adults are uncooperative during dental treatment and for more varying reasons (Klingberg and Broberg 2007). Maturity and temperament are among the factors known, as well as their social environment (e.g. parents). Probably the most important factor is their immediate response to painful stimuli, which normally bring about physical and

psychological reactions to protect the body from tissue damage. Children are less able than adults to control these immediate reactions, which makes them extremely vulnerable to painful medical and dental interventions.

Pain control during invasive dental treatment is therefore extremely important in children. The most important tool is local analgesia, but many children also have problems coping with intra-oral injections. A large number of studies have reported that conscious sedation is effective in enabling children to cope with injections and dental treatment, but there is controversy about whether certain drugs and techniques are more effective than others (Matharu and Ashley 2005). In a study where the effectiveness of sedation in combination with behaviour-shaping techniques based on the 'tell-show-do' technique was compared with behaviour shaping alone, the two methods were equal in allowing treatment, but the use of sedation was slightly more time effective (Raadal et al. 1999). It may be concluded that the use of sedation is indicated during invasive dental treatment procedures among uncooperative and anxious children and that it should be used in combination with psychological techniques.

Preoperative Assessment

For the preoperative assessment of the patient before use of sedation, particularly whether there are any contraindications for the use of sedation, the American Society of Anesthesiologists' (ASA) classification system of the patient's physical health should be used (American Society of Anesthesiologists 2011). The physical status is classified as follows:

- IA normal healthy patient
- IIA patient with mild systemic disease
- IIIA patient with severe systemic disease
- IVA patient with severe systemic disease that is a constant threat to life
- VA moribund patient who is not expected to survive without the operation
- VIA declared brain-dead patient whose organs are being removed for donor purposes

Dentists are expected only to treat patients in categories I and II without being accompanied by a physician/anaesthetist.

Other contraindications are patients with an acute general disease, allergy to any of the drugs, neuromuscular diseases and interactions with any medications that the patient uses. Sedation should be used with special caution in patients who are using other substances with depressing effects on the central nervous system (CNS), such as opiates, antipsychotics, antidepressants and antiepileptics.

Sedatives and Techniques

A large variety of medications has been and still is in use worldwide for sedation during dental treatment. Presently the *benzodiazepines* and *nitrous oxide* seem to be the drugs of first choice (Berthold 2007; Hallonsten et al. 2003; Jackson and Johnson 2002).

Benzodiazepines

This is a large group of chemical variations with related properties. Their clinical effects are anxiolytic, sedative/hypnotic and muscle relaxing. The basic pharmacodynamics is by modulation of the gamma-amino-butyric acid (GABA) effect, which is the dominating inhibitory neurotransmitter in the CNS. The benzodiazepines bind to GABA receptors in the CNS thereby suppressing activity in the nerve cells (Saari et al. 2011). Their high lipophilicity allows quick passage across the blood–brain barrier to produce rapid onset of action. The toxicity is low and the risks for serious complications in dentistry are therefore low when used in accordance with acknowledged principles for indications and contraindications.

The absorption rate and plasma concentration of benzodiazepines are dependent upon the route of administration (Dundee et al. 1984). Even if there are great variations between type of drug and patients, the general rule is that per oral administration is slowest since the drug is mixed with the content in stomach and intestines and after having passed the liver, part of the drug is lost before becoming bioavailable in plasma. For example peak level of midazolam is estimated to be about one hour after administration. Intravenous administration is the fastest and most effective, while the rectal route is slightly faster than oral.

Most frequently used in Scandinavia are *diazepam*, *midazolam* and *flunitrazepam* (Hallonsten et al. 2003; Norwegian Medicines Agency 2003). They have similar pharmacological properties, but different duration times, dependent on their elimination half-life, redistribution from the brain to peripheral tissues and whether they have active metabolites or not. Diazepam has the longest elimination half-life (20–70 hours), midazolam the shortest (1.5–3.5 hours), while flunitrazepam is somewhere between them (14–36 hours) (Benet, Øie and Schwartz 1996). The clinical choice of use may therefore be based on how long sedation is needed for.

Diazepam has a long working time due to its long elimination half-life and active metabolites and it is therefore most indicated for prevention of anticipatory anxiety. A 10 mg tablet the night before dental treatment reduces preoperative anxiety, promotes a good night's sleep and helps the patient to show up for the appointment. The dose may be supplied with 10 mg diazepam or 0.5 mg flunitrazepam in the morning so that the patient is more relaxed before treatment, either psychological treatment, dental treatment or a combination (Table 11.1).

Midazolam has the shortest working time because of fast elimination and is therefore suitable for perioperative treatments of short duration. The drug is available in ampoules meant for intravenous administration, but the solutions may also be used for oral and rectal (small children) routes. Since the taste is very bitter, it must be mixed with some kind of juice or other good tasting additive for oral administration. The suggested dose is 0.5 mg/kg for oral and 0.4 mg/kg for rectal use, with a maximum dose of 12 mg and 10 mg, respectively (Table 11.1).

Table 11.1 Suggested doses of midazolam and flunitrazepam for perioperative sedation. Norwegian Medicines Agency 2003.

<i>Drugs and routes</i>	<i>Doses (mg/kg)</i>	<i>Maximum dose (mg)</i>
Midazolam, oral	0.4–0.5	12
Midazolam, rectal	0.3–0.4	10
Flunitrazepam, oral	0.02–0.025	20–40 kg: 0.5 mg > 40 kg: 1 mg

Flunitrazepam lies between diazepam and midazolam in working time and is available in tablets with neutral taste. It may either be swallowed as a whole, placed underneath the tongue (absorption through the mucosa), or crushed and dissolved in a drink and this makes it very practical to use for perioperative sedation in both children and adults. The suggested dose is 0.025 mg/kg with a maximum of 1.0 mg for adults (Table 11.1).

As a general rule the doses may be increased by 50 per cent during the next session in cases where the suggested dose seems to have been ineffective, provided no side effects have appeared (Norwegian Medicines Agency 2003). For patients above 65 years of age the doses should be reduced to about half of those suggested in Table 11.1.

Intravenous sedation

Administration of benzodiazepines by intravenous titration is probably the safest and most controllable way for obtaining a required level of sedation. However, the challenge is to have the anxious patient accept the insertion of an IV cannula. In small children it may also be difficult to find a suitable vein due to the rather thick subcutaneous layer. The most frequent indication therefore seems to be adolescents and adult patients with need for some kind of invasive dental treatment (e.g. oral surgery) and able to cope with an extra-oral injection.

Midazolam is most frequently reported as a suitable drug for perioperative IV sedation in dentistry. According to the abundant literature on this, the variability of suitable doses is great. In a study of effectiveness and safety among children and adolescents (Lourenco-Matharu and Roberts 2011) the technique was the following: titration of 1 mg midazolam over 30 seconds, waiting 90 seconds and then giving increments of 1 mg every 30 seconds until the appropriate level of sedation is achieved according to the patient's response, without exceeding 10 mg.

Inhalation sedation with nitrous oxide–oxygen

Nitrous oxide–oxygen sedation has long traditions in dentistry and has proven to yield high success rates and safety (Hallonsten, Koch and Schroder 1983; Peretz et al. 1998). A combination of nitrous oxide and oxygen is inhaled through a nasal hood, inducing a combined sedative and analgesic effect. The procedure starts with 100 per cent oxygen during 2–3 minutes for preoxygenation of the lungs and having the patient adjust to the equipment and then increasing concentrations of nitrous oxide are administered until suitable levels of conscious sedation and analgesia are obtained (usually 30–50 per cent).

Similar as for the benzodiazepines, there are large variations regarding the individual susceptibility to the gas. Some patients experience pleasant sedation levels on low gas concentrations (20–30 per cent), whereas others need much higher levels (40–60 per cent). A great advantage with nitrous oxide–oxygen sedation is that the sedation levels of a certain concentration are attained after a few minutes' inhalation, which means that the operator can adjust the dose of medication to the situation with almost immediate effect.

Nitrous oxide–oxygen sedation can be used in combination with benzodiazepines in which the two drugs have an additive effect (Jackson and Johnson 2002). A frequently applied approach is that the patient is given a benzodiazepine preoperatively, e.g. the night before and/or in the morning in order to prevent anticipatory anxiety and nitrous oxide is then applied during treatment if an additive sedative/analgesic effect is needed. Since the nitrous

oxide concentration can be increased continuously with almost immediate sedative and analgesic effect, this approach gives an opportunity for the operator to adapt the level of sedation to the present clinical needs.

Inhalation sedation with nitrous oxide requires special scavenging equipment to ensure safety for the personnel in the operating room (American Dental Association 2007; Department of Health 2003).

Side Effects and Safety

Since the use of sedation is associated with increased risk for the patients and also for the responsibility of the operator, dentists should estimate their own competency within the framework of their authorization (American Dental Association 2007; Norwegian Medicines Agency 2003; The Royal College of Anaesthetists 2007). The competency must include knowledge about the drugs, their effects, side effects and interactions, as well as the national regulations related to them. This also includes appropriate equipment.

The site of action of both benzodiazepines and nitrous oxide is the CNS with a general depressing activity. This also includes a risk for inhibition of respiration and reduced protective reflexes (gag and cough). Since treatments in the oral cavity takes place in close proximity to the airway, a major concern is that a reduced cough reflex implies risk for aspiration. These risks are primarily related to overdosing of the drug, but since there are large individual variations to the same dose, the operator must always be prepared for these risks.

The patient must therefore be continuously monitored during the treatment. Most important is to keep verbal contact in order to estimate the depth of sedation. If the patient tends to fall asleep and is not able to keep the mouth open, indicating that the sedation is deeper than expected, the dental treatment must either be cancelled or adapted to this situation in order to prevent aspiration. Use of pulseoximetry is suggested in situations where the operator is unsure about a possible reduced ventilation and blood desaturation.

The most frequently reported side effects of sedation are restlessness, nausea and vomiting (Hallonsten et al. 1983). Combined with a possible reduced cough reflex during the sedation, this increases the risk for aspiration. Most guidelines therefore suggest fasting before sedation, but fasting rules vary between countries. The UK guidelines (Department of Health 2003) state that fasting before conscious sedation is not normally required, but patients should be advised to take only light food and clear non-alcoholic fluids prior to the appointment. The American Academy of Pediatric Dentistry (2006) suggests that the fasting period before elective sedation generally should follow those used for elective general anaesthesia. This includes 2 hours for clear liquids and 6 hours for milk and food. The European Academy of Paediatric Dentistry guidelines (Hallonsten et al. 2003) and Norwegian guidelines (Norwegian Medicines Agency 2003) are followed in our clinic at the University of Bergen and they are listed in Table 11.2.

Table 11.2 Suggested fasting before conscious sedation.

- No clear liquids (water, juice, tea, coffee) 2–3 hours before sedation
- No solid foods or non-clear fluids (milk products) 4 hours before sedation

Documentation and Records

All guidelines on sedation in dentistry recommend accurate documentation of the sedation session. This should include the medical history, indications for use of sedation, preoperative assessment, fasting, dose and route of sedative, monitoring procedures and possible complications. It is also suggested that the procedures of information and patient consent are recorded.

Sedation and CBT

Sedation is generally not an alternative to CBT and other psychological treatments for patients with dental phobia, but it may be an adjunct. The most obvious indications for use of sedatives are emergency cases and other cases where the dental treatment must be prioritized before treatment of the phobia. Conscious sedation implies that the patient is awake and mentally involved in the situation and the main effect of the drug is to keep the patient more relaxed and less anxious. These effects will be reinforced by the use of psychological techniques such as establishing a good relationship, tell-show-do and empathy. These techniques are necessary in order to utilize the effect of conscious sedation. Or vice versa, sedatives may strengthen the effect of psychological techniques in these situations.

For patients with dental phobia, without dental emergency needs, the general rule should be that treatment of the phobia is prioritized and that the dental treatment follows the patient's improved coping ability during and after the phobia treatment. In these cases conscious sedation may be an adjunct to the psychotherapy in preventing anticipatory anxiety, reducing anxiety during exposure therapy and during special anxiety-provoking dental treatment procedures during or after the phobia treatment.

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Effects of Cognitive Behavioural Treatments

A Systematic Review and Meta-Analysis

Lars-Göran Öst and Gerd Kvale

Description of Treatments Evaluated in Randomized Controlled Trials

A large number of more or less different psychological treatments have been subjected to stringent evaluation in randomized controlled trials. The diversity of methods reflects to a large extent the general picture of treatments used for specific phobias in general. Thus, even if dental phobia is one of the few specific phobias where confrontation with the phobic situation may entail pain, researchers in the field have not found it necessary to develop specific treatments for this phobia. However, for dental phobia there may be an important distinction whether or not the treatment involves exposure *in vivo*. Below follows a description of the most important of these treatment methods.

Systematic desensitization

The oldest form of cognitive behaviour therapy (CBT) for phobias is systematic desensitization (SD), developed by Joseph Wolpe (1958) and it has three components. It starts with a shortened form of progressive relaxation in which the patient learns to relax the gross body muscles. In parallel with the relaxation training the second component means that the therapist and patient construct a hierarchy of anxiety-arousing situations covering all the important aspects of the patient's phobia. Each situation is given an anticipated Subjective Unit of Disturbance (SUD) value from 0–100 and rank ordered based on this. Finally, in the third component the therapist present the lowest situation from the hierarchy to the relaxed patient who imagines being in that situation. This is done in gradually longer time periods, usually 10,

20 and 30 seconds. If the patient can imagine the situation for 30 seconds without feeling anxious that particular situation is considered to be desensitized. The same procedure is then repeated for all the remaining situations in the patient's hierarchy.

In dental phobia SD was first used by Shaw and Thoresen (1974). The difference from the standard SD was that the scenes in the hierarchy were presented via audio tapes instead of verbally by the therapist. Gatchel (1980) made further changes in that he used a group format and employed a version of SD called self-control desensitization. A standard hierarchy of 16 situations was used but these situations were presented in general terms and the patients were instructed to fill them out with individual details. Finally, each imagination of a situation lasted for 60 seconds and the patients were trained to use relaxation as a coping skill. Moore and Brødsgaard (1994) presented relaxation instructions via an audio cassette and anxiety scenes employing eight 30-second videotaped dental scenes as developed by Carlsson, Linde and Öhman (1980). All examples have as general features that patients are trained in relaxation and anxiety-arousing situations are presented in a gradual fashion, but not *in vivo* as is done in exposure.

Exposure

When a treatment has the phobic patient confronting his or her anxiety-arousing situations in reality, the method is called exposure. It can be done in imagination (*in vitro*) or in real life (*in vivo*). The exposure can also be performed gradually, as is usually the case nowadays, or directly with the highest situation in the patient's hierarchy, which is called flooding. The purpose of exposure is for the patient to learn that the anxiety reactions to the phobic stimuli, e.g. palpitations and subjective fear, are reduced (habituation takes place) as long as the patient remains in the situation instead of escaping from it.

The flooding type of exposure was mainly used in the 1970s–80s and is illustrated in the dental phobia area by Mathews and Rezin (1977), with imaginal flooding and Gauthier et al. (1985) who used auditory stimuli recorded during actual dental procedures. However, flooding has almost completely been replaced by gradual exposure since it is a very hard treatment emotionally, both for patient and therapist, but without leading to better effects than gradual exposure.

Gradual exposure is illustrated by the Moore (1991) and Moore and Brødsgaard (1994) studies, but called clinical rehearsal. However, the same method is described somewhat differently in these two studies. In the first study the author talks about 'direct exposure to threatening dental situations or dental instruments in gradual, approximating steps' (p. 231), whereas in the second study it is described as 'direct, but simulated exposure to dental situations or dental instruments in gradual, approximating steps' (p. 259). This means that either the authors used two versions of the treatment but called it the same or it was just one version and they realized that they needed to qualify the description with the words 'but simulated' in the second study.

The most clear-cut example of exposure *in vivo* comes from the Haukebø et al. (2008) study. In this study the exposure *in vivo* treatment starts with a fairly low situation in the individual patient's anxiety hierarchy and then gradually continues up the 'ladder' as soon as the lower situation has been achieved by the patient. The exposure treatment is usually carried out across a number of sessions (e.g. five), but it can also be done in one prolonged so-called one-session treatment (OST), which is described in detail in Chapters 9–10 of this volume. This treatment is a combination of exposure *in vivo*, modelling and brief cognitive therapy.

Another treatment for dental phobia performed in just one session of 90 minutes was described by Thom, Sartory and Jöhren (2000). This consists of anxiety management training, imaginal exposure to phobic situations and stress-inoculation training.

Behaviour therapy

A multimodal behavioural treatment first described by Berggren and Carlsson (1984) and used in a randomized controlled trial (RCT) by Berggren and Linde (1984) consists of progressive relaxation and desensitization to 30-second videotaped dental treatment scenes in combination with biofeedback training. This treatment is carried out by a psychologist during about eight sessions and followed by two sessions of adjusted conventional dental treatment by a dentist. During this phase the patients are encouraged to apply the techniques they learned during the first phase with the psychologist. In the next RCT from the same research group (Harrison, Berggren and Carlsson 1989) the same treatment was called *systematic desensitization*. In the third study (Hammarstrand, Berggren and Hakeberg 1995) the method was called *psychophysiological therapy* and in the fourth (Berggren, Hakeberg and Carlsson 2000) and fifth studies (Lundgren, Carlsson and Berggren 2006) the name used was *relaxation therapy*. A detailed description of this method is provided in Chapter 8 of this volume.

Getka and Glass (1992) used a six-session behavioural treatment which consisted of a combination of videotaped modelling, relaxation training, videotaped desensitization and self-paced *in vivo* practice in the dental clinic.

Cognitive behaviour therapy

Cognitive therapy was developed by Beck, Emery and Greenberg (1985) for anxiety disorders in general and by Clark (1986) for panic disorder in particular. With the emergence of cognitive therapy the focus shifted from features of the dental situation to the patients' *cognitive misinterpretations* (catastrophic beliefs), helping patients to challenge the evidence for their beliefs and substituting them with realistic interpretations that are based on real evidence. Behavioural experiments are used to test specific beliefs during therapy sessions and often as homework assignments between sessions. This type of treatment was used in an RCT for dental phobia by Willumsen, Vassend and Hoffart (2001) across 10 sessions, but they also used exposure in accordance with standard dental procedures.

A much briefer treatment, just one session of one hour, was used by De Jongh et al. (1995) as a preparation for dental treatment. The treatment was focused on negative cognitions that were evident after the patient had answered the Dental Cognitions Questionnaire. The intervention was focused on cognitions for which patients rated at least 70 per cent believability. This was achieved by asking the patient for the evidence he or she had for the specific thought, challenging this evidence and helping the patient to view the situation in another, realistic way. In those cases where the patient clearly lacked information about the dental procedure in question such information that could help correct the negative cognition was provided.

Another example of this approach is the Haukebo et al. (2008) study, where the patients' catastrophic beliefs were identified and challenged in a dental treatment situation in which the dental treatment was an integrated part of the fear treatment, delivered by a specially trained dentist. This approach was tested in a five- as well as one-session approach.

Coping techniques

There are a number of treatment methods called coping techniques which are characterized by teaching the patient some kind of skill that can be used in the actual anxiety-arousing situation in order to stop the anxiety reactions from escalating and eventually abort them altogether.

Applied relaxation (AR) was developed by Öst in the late 1970s and used in a first RCT on social phobia in 1981 (Öst, Jerremalm and Johansson 1981) and later in an RCT for claustrophobia (Öst Johansson, and Jerremalm 1982) and agoraphobia (Öst, Jerremalm and Jansson 1984). A group version of AR was used in an RCT of dental phobia (Jerremalm, Jansson and Öst 1986) and the individual version in the study by Willumsen et al. (2001). AR can be seen as a course across 8–10 sessions, starting with progressive relaxation, which takes about 15 minutes to instruct. This component instructs patients to briefly tense and then relax the specific muscle groups included. In the second component, release-only relaxation which takes 7–8 minutes, the tension instruction is deleted and patients are just instructed to relax the muscle groups. The third component, cue-controlled or conditioned relaxation, teaches the patient to connect the self-instruction ‘Relax’ with the state of relaxation and takes 2–3 minutes. In the fourth component, differential relaxation, the patient is taught how to be relaxed in the muscle groups that are not used for the activity at hand. In this phase it usually takes the patient 60–90 seconds to become relaxed. The fifth component, rapid relaxation, has been reduced to four simple instructions and at the end of practising during this phase it takes the patient 20–30 seconds to become relaxed in natural, but non-anxiety situations. The last component, application training, allows the patient to apply the skill of relaxing rapidly in anxiety-arousing phobic situations. In these situations the patients will experience the initial anxiety reaction, apply the AR for as long as they need and notice that the reaction is reduced and aborted altogether. In the Jerremalm et al. (1986) study the patients were instructed to apply the skills during dental treatments with an ordinary dentist outside the research project.

Stress inoculation training (SIT) was developed by Meichenbaum (1977) and consists of three components. In the first, which is educational, the therapist presents a conceptualization of anxiety and in the second the patient is taught various coping skills (cognitive, physiological or behavioural) that can be used in counteracting anxiety reactions. The final component allows the patient to practise the acquired coping skills while being exposed to anxiety-arousing stimuli. SIT has been used in RCTs for dental phobia by Moses and Hollandsworth (1985), Getka and Glass (1992), Berggren et al. (2000) and Lundgren et al. (2006) even if the latter two called the treatment cognitive therapy. A version of SIT, called self-instructional training and focusing completely on the cognitive component, was used in the study by Jerremalm et al. (1986). Another version used by Ning and Liddell (1991) was called anxiety management training and consisted of relaxation training and cognitive restructuring in combination with imaginal exposure. However, none of these approaches implies real experience with the feared dental treatment situation during the phobia treatment.

Modelling

A treatment developed by Bandura and co-workers in the late 1960s early 1970s (e.g. Bandura et al. 1974) is called modelling and can be carried out in various ways, e.g. video presentation or *in vivo*. In this treatment models that the patients can identify with age- and

gender-wise are successfully performing the behaviours that the phobic patients are avoiding. Often, this is combined with exposure *in vivo* where the patients in the second phase perform these behaviours, first with the help of the therapist and then on his or her own. In dental phobia modelling has been used in RCTs by Shaw and Thoresen (1974) and Wroblewski, Jacob and Rehm (1977).

Miscellaneous treatments

Various treatment methods have only been used in one RCT each. Progressive relaxation and electromyographic biofeedback were employed by Miller, Murphy and Miller (1978) and hypnotherapy by Hammarstrand et al. (1995).

Was exposure *in vivo* used?

For specific phobias in general exposure *in vivo* is the treatment with the strongest evidence-base (Wolitzky et al. 2008). Thus, it is interesting to look at the use of this method in RCTs for dental phobia. The clearest example of exposure *in vivo* is the Haukebø et al. (2008) study in which both the one- and the five-session treatment were completely carried out *in vivo*, in a framework of dental treatment, by a dentist trained to do the phobia treatment. It was supplemented with cognitive procedures helping the patient to challenge cognitive distortions (catastrophic beliefs). In the Gothenburg studies (Berggren and Linde 1984; Berggren et al. 2000; Hammarstrand et al. 1995; Harrison et al. 1989; Lundgren et al. 2006) the *in vivo* exposure was restricted to two sessions with a fear clinic dentist, following the initial eight sessions with a psychologist. Berggren and Linde (1984) described the content of these sessions as ‘adjusted conventional dental treatment using perceived control and reattribution of negative stimuli’ (p. 1223). Getka and Glass (1992) used two (out of six) sessions for ‘self-paced *in vivo* practice’ and, as described above, concerning the Moore (1991; Moore and Brødsgaard 1994) studies it is difficult to ascertain whether the exposure was real or simulated. All the other studies that used exposure employed some kind of imaginal or *in vitro*. However, the majority of RCTs in dental phobia have used treatment without exposure *in vivo* or *in vitro*.

Systematic Review

Criteria for inclusion of studies

In order for a study to be included in the systematic review and meta-analysis the participants had to be randomly assigned to one treatment group and one control group, or at least two active treatment conditions. Thus, one-group studies with pre- and post-treatment assessment or quasi-experimental designs were not included. Table 12.1 presents an overview of the included studies. There is a total of 22 RCTs published between 1974 and 2008, making 0.63 RCTs per year, which is not a particularly impressive research output. In roughly the same time interval 80 RCTs on other specific phobias were published, i.e. a rate of about two studies per year.

Ning and Liddell (1991)	Canada	University	Advertisement	DAS score ≥15	12	14	75	35.9	8.3 (1–30)
Getka and Glass (1992)	USA	University	Advertisement	DAS score ≥13	41	18	54	33.0	2.5
Moore and Brødsgaard (1994)	Denmark	Dental fear clinic	Advertisement	DAS score ≥15	98	50	50	36.9	9.7 (19–65)
De Jongh et al. (1995)	Holland	Dental fear clinic	Referrals and advertisement	DAS score ≥15	52	26	52	31.0	6.0 (1–27)
Hammarstrand et al. (1995)	Sweden	Dental fear clinic	Referred to specialist Tx	Dental fear and avoidance	22	19	100	31.8	9.5 (3–22)
Berggren et al. (2000)	Sweden	Dental fear clinic	Self-referrals specialist Tx	Refused conventional dental treatment	112	74	73	32.8	9.3
Thom et al. (2000)	Germany	University	Referrals	DAS score ≥13					
Willumsen et al. (2001)	Norway	Dental fear clinic	Self-referrals	DSM-IV specific dental phobia	50	29	52	30.4	16.5
Lundgren et al. (2006)	Sweden	Dental fear clinic	Self-referrals specialist Tx	DAS score ≥15	62	34	64	33.7	11.7
Haukebø et al. (2008)	Norway	Dental fear clinic	Referrals and self-referrals	Refused conventional dental treatment	115	27	74	33.3	NI
				DAS score ≥13					
				DSM-IV specific dental phobia	40	33	65	34.9	11.4

Notes: BAT: Behavioural Approach Test; DAS: Dental Anxiety Scale; NI: No information; Tx: Treatment

Country

Seven of the RCTs originate from the USA, six from Sweden (five of which are from the Gothenburg group), two each from Canada, Norway and Denmark and one each from England, Holland and Germany. Compared to the treatment research studies in anxiety disorders overall Australia, England and Germany are underrepresented, whereas Sweden has a higher proportion of studies than expected.

In order to compare studies from North America and Europe on self-reported dental anxiety severity the different samples' pre-treatment scores were transformed to a percentage of the maximum score possible on the questionnaire. Independent *t*-test showed that European studies (*M* 86.9, *SD* 5.1) had a significantly higher severity score ($t(18)=3.22, p<0.005$) than American studies (*M* 77.0, *SD* 8.8).

Treatment setting

Half of the studies (11) were carried out in a university setting, 10 in special dental fear clinics at schools of odontology and one at a physician's office adjacent to a dental surgery.

In order to compare the two treatment settings on self-reported dental anxiety severity the different samples' pre-treatment scores were transformed to a percentage of the maximum score possible on the questionnaire. Independent *t*-test showed that studies carried out in dental fear clinics (*M* 87.8, *SD* 5.1) had a significantly higher severity score ($t(18)=3.20, p<0.005$) than the university-based studies (*M* 78.1, *SD* 8.1).

Therapists

In a majority of studies (11; 50 per cent) psychologists or graduate students in clinical psychology were therapists, whereas in the five studies (23 per cent) from the Gothenburg research group a psychologist started and then a specially trained dentist carried out a combination of fear and dental treatment. In three studies (Gatchel 1980; Haukebo et al. 2008; Willumsen et al. 2001) dentists were trained to carry out the psychological treatments and in the last two studies components of dental treatment were inserted in the therapy process. In three studies no information about the therapists' profession was given.

Recruitment

Ten of the RCTs had patients who were referred for dental phobia treatment, whereas nine of the studies advertised for their subjects in local media (newspapers, radio or television). One study selected patients from a dentist's file of active patients and two studies did not give any information on how patients were recruited.

In order to compare the two main ways of recruitment on self-reported dental anxiety severity the different samples' pre-treatment scores were transformed to a percentage of the maximum score possible on the questionnaire. Independent *t*-test showed that studies with patients who were referred for treatment (*M* 87.7, *SD* 4.2) had a significantly higher severity score ($t(18)=3.09, p<0.006$) than studies with patient recruited via advertisements (*M* 78.2, *SD* 8.7).

Inclusion criteria

In anxiety disorders in general the primary inclusion criterion is that the patients must fulfil DSM (APA) or ICD (WHO) diagnostic criteria for the disorder in question. The DSM-III was published in 1980, DSM-III-R in 1987 and DSM-IV in 1994. This means that 17 of the 22 RCTs could have used some of these versions, however, only two did (Haukebo et al. 2008; Thom et al. 2000). One possible explanation for this low rate of using diagnostic criteria is that most studies done at schools of odontology were carried out by dentists who were not used to applying psychiatric diagnostic criteria.

Various types of criteria have been used. e.g. a pre-treatment score on the Dental Anxiety Scale of 13 or more (two studies), 15 or more (four studies), displaying dental fear and avoidance and refusing conventional dental treatment (five studies), avoiding dental treatment for at least one year (five studies), self-report of strong fear of dental treatment (two studies), failing a behavioural approach test of dental treatment (one study) and refusing an anaesthetic injection (one study).

Number of patients in the RCTS

The number of dental phobia patients in the studies varies from 14 (Gauthier et al. 1985) to 112 (Berggren et al. 2000). If we divide the studies into decades the following positive trend emerges. In the 1970s the mean number of patients per treatment condition was 9.8, which increased to 14.5 in the 1980s, 18.4 in the 1990s and 25.5 in the 2000s.

Statistical power

Besides the actual difference in means between conditions in a study the number of patients per condition is the most important factor in deciding what power to detect a difference a study has, providing that a difference really exists. The column called power in Table 12.1 shows what statistical power each study has to detect a moderate effect size ($d=0.50$). Only three studies (Berggren and Linde 1984; Berggren et al. 2000; Moore and Brødsgaard 1994) had at least a 50 per cent chance of detecting a moderate effect size. The mean power across the 22 RCTs is only 28.5 per cent.

Gender distribution and age

The two studies by Moore (1991; Moore and Brødsgaard 1994) have an equal gender distribution, whereas all the other RCTs have a majority of females. Hammarstrand et al. (1995) even had a sample including females only. Across the 22 studies 68.3 per cent of the patients were women. The mean ages of the samples varied from 26.0 (Wroblewski et al. 1977) to 37.4 (Moore et al. 1991) with an overall mean of 33.2 years.

Avoidance of dental work

The mean number of years of avoidance of dental work varied from 2.5 (Getka and Glass 1992) to 24.4 (Jerremalm et al. 1986) with an overall mean of 10.1 years. Since there is an almost 10 times difference between the minimum and maximum values on this

variable it is reasonable to assume that different definitions of dental work avoidance were used. However, the information given in the articles are too sparse to allow an analysis if this is the case.

Assessments

The most common measure was a self-rating of dental fear or anxiety, which was used in all but one study (Gauthier et al. 1985) and the Dental Anxiety Scale was applied in 19 of the 22 RCTs (86 per cent). Self-rating of dental beliefs or cognitions was used in six studies, whereas other dental specific ratings were employed in three studies. Self-rating of general fears (Fear Survey Schedule of different editions, Geer Fear Scale) was used in seven studies and self-rating of general anxiety (State-Trait Anxiety Inventory) in eight studies.

A graded behavioural approach test (BAT) assessing the patients' performance regarding ordinary dental work was used in only five RCTs (Gauthier et al. 1985; Haukebø et al. 2008; Jerremalm et al. 1986; Mathews and Rezin 1977; Wroblewski et al. 1978).

Asking a dentist to use a structured rating of the patient's overt behaviour during dental treatment is very informative, but was only used in three studies (Berggren and Linde 1984; Getka and Glass 1992; Jerremalm et al. 1986). Psychophysiological assessment (heart rate, skin conductance, electromyographic response) was employed in 5 studies (Getka and Glass 1992; Jerremalm et al. 1986; Lundgren et al. 2006; Miller et al. 1978; Thom et al. 2000).

Finally, perhaps the most ecologically valid measure is whether the patients after the dental phobia treatment manage to go through regular dental treatment, either at an ordinary dentist in the community (15 studies) or with a dentist attached to the dental phobia clinic (three studies). Thus, this kind of measure was used in 18 out of 22 studies (82 per cent).

Meta-Analysis

Table 12.2 shows the treatment data for the 22 RCTs included in the meta-analysis.

Treatment sessions and hours

The number of therapy sessions varies from 1 to 10 with a mean of 5.4 (SD 3.4). Since the length of a session can vary considerably a recalculation to number of 60-minute units has been done. The mean hours of therapy was 6.0 (SD 3.9).

Attrition

The proportion of patients who dropped out and did not complete the assigned treatment varied from 0 per cent (in 22 out of 50 treatment groups) to 55 per cent (hypnotherapy) with a mean of 9.6 per cent (SD 13.1). This can be compared with the overall attrition rate of 6.4 per cent for CBT randomized studies in all types of specific phobia, published between 1968 and 2009 (Öst 2011).

Table 12.2 Treatment data for the studies included in the meta-analysis

Study	Treatment		Sex	Hours	n	Drop-out %	Self-rated dental fear/anxiety			F-up		Dental Tx	
	Conditions	Measure					Result	ES post	ES fup	F-up (mon.)	Post	F-up	
Shaw and Thoresen (1974)	1. Modelling (video)	10	10.0	9	0	0	Fear of dentist	1 = 2 > 3 = 4	2.95	0	78		
	2. SD			9	0				2.29		44		
	3. Placebo control			9	0				0.32		11		
	4. WLC			9	0				-0.26		0		
Mathews and Rezin (1977)	1. Flooding/cop.-high arousal	4	3.3	14	29		Dental Anxiety Q.	1 = 2 = 3 = 4 = 5	NI	NI	2	80	
	2. Flooding-high arousal			10	0							20	
	3. Flooding/cop.-low arousal			12	17							30	
	4. Flooding-low arousal			12	17							60	
	5. Relaxation control			15	33							30	
Wroblewski et al. (1977)	1. Symbolic mod. + Relaxation	10	5.3	9	0	0	DAS	1 = 2 = 3	NI	NI	1	78	
	2. Symbolic modelling			9	0							22	
	3. Attention placebo			9	0							11	
Miller et al. (1978)	1. EMG-biofeedback	4	3.3	7	0	0	DAS	1 = 2 > 3	2.09	0	NI		
	2. PR		6.6	7	0				1.64				
	3. Self-relaxation control		3.3	7	0				0.85				
Gatchel (1980)	1. Self-control desensitization	3	9.0	8	0	0	DAS	1 > 2 = 3	1.82	0	88		
	2. Education/discussion			5	0				1.07		100		
	3. NTC			6	0				0.25		33		
Berggren and Linde (1984)	1. BT (SD, BF, video modelling)	?	M:6.0	50	8		DAS	1 > 2	2.67	2.42	24	78	
	2. General anaesthesia			49	24				2.46	1.88		53	
Gauthier et al. (1985)	1. Flooding+Coping	4	8.0	7	7		Self-rating of fear during BAT	1 = 2	NI	NI	4	43	
	2. Coping + Flooding			7	0							100	

(continued)

Table 12.2 (cont'd).

Study	Treatment		Self-rated dental fear/anxiety				Dental Tx	
	Conditions	Sess.	Hours	n	Drop-out %	F-up		Dental Tx
						Measure	Result	
Moses and Hollandsworth (1985)	1. Stress inoculation training	1	3.5	6	0	DAS	1 = 2 = 3 = 4	83
	2. Coping skills + application	1	2.5	6	0			83
	3. Education alone	1	1.5	6	17			33
	4. WLC			6	0			0
Gatchel (1986)	1. Videotaped BT moderate fear	1	0.5	20	0	DAS	1 > 2; 3 > 4	70
	2. Videotaped placebo mod. fear	1	0.5	20	0			30
	3. Videotaped BT high fear	1	0.5	20	0			25
	4. Videotaped placebo high fear	1	0.5	20	0			15
Jerremalm et al. (1986)	1. Cogn. reactors - AR	9	13.5	10	20	DAS	1 = 2; 3 = 4	100
	2. Cogn. reactors - SIT	9	13.5	10	10			86
	3. Phys. reactors - AR	9	13.5	8	13			100
	4. Phys. reactors - SIT	9	13.5	9	11			100
Harrison et al. (1989)	1. BT (PR, EMG-bf, video exp.)	?	?	16	6	DAS	1 = 2	94
	2. BT + Cognitive coping			16	6			60
Moore (1991)	1. BT (SD, BF, Video modelling)	?	M:9.2	32	16	DAS	1 = 2	93
	2. Gradual exposure	?	M:5.8	34	3			95
Ning and Liddell (1991)	1. Massed anxiety management	2	?	9	33	DAS	1 = 2	100
	2. Spaced anxiety management	4	?	9	33			100
Getka and Glass (1992)	1. Cognitive behaviour therapy	5	6.0	11	0	DAS	1 = 2 > 3 = 4	NI
	2. Semi-automated BT	5	6.0	10	0			NI
	3. Positive dental experience	1	1.0	10	0			NI
	4. WLC			10	0			NI

Moore (1994)	1. Video desensitization Ind. 2. Clinic simulated reh. Ind. 3. Video desensitization group	1 1 7	0.5 0.5 14.0	32 34 30	16 3 20	Dental Fear VAS	3>2; 1=2; 1=3	3.59 2.98 4.99	3.21 2.26 4.74	12	89 88 63
Hammarstrand et al. (1995)	1. BT (PR, EMG-bf, video exp.) 2. Hypnotherapy	8 8	8.0 8.0	11 11	27 55	DAS	1=2	2.54 2.31		0 36	73 36
De Jongh et al. (1995)	1. Cognitive intervention 2. Information intervention 3. WLC	1 1 1	1.0 1.0	15 14 23	0 0 0	DAS	1>2=3	1.00 0.00	4.20 3.00	12	NI NI NI
Berggren (2000)	1. Relaxation 2. Cognitive treatment	8 8	8.0 8.0	54 58	33 17	DAS	1=2	3.65 3.71		0	59 74
Thom et al. (2000)	1. Behaviour therapy 2. Benzodiazepines (midazolam) 3. Control group	1	1.5	20 20 10	10 25 50	DAS	1>2=3	2.11 0.82 0.61	2.50 0.68 0.61	2	70 20 10
Willumsen et al. (2001)	1. Cognitive therapy 2. Applied relaxation 3. Nitrous oxide	10 10 10	10.0 10.0 10.0	21 22 22	0 9 5	DAS	2>3; 1=2	4.37 8.15 6.38	3.53 6.77 5.13	60	66 71 46
Lundgren et al. (2006)	1. Relaxation + Low PR 2. Relaxation + High PR 3. Cognitive therapy + Low PR 4. Cognitive therapy + High PR			18 15 15 18	22 22 22 22	DAS	1=3; 2=4	2.55 1.83 1.83 1.81		0	NI
Haukebø et al. (2008)	1. Exposure <i>in vivo</i> 5 s 2. Exposure <i>in vivo</i> 1 s 3. WLC	5 1	5.0 3.0	10 10 20	5 0 0	DAS	1>2>3	2.57 2.25 0.14	2.32 3.10	12	100 74

Table 12.3 Uncontrolled effect sizes and dental treatment for the various treatment methods at post and follow-up. Only methods having at least two treatment groups in the analysis are included.

<i>Treatment</i>	<i>Post</i>		<i>Follow-up</i>		<i>Dental treatment</i>
	<i>k</i>	<i>ES</i>	<i>k</i>	<i>ES</i>	
Systematic desensitization	4	3.17	2	3.98	71.0%
Exposure <i>in vivo</i>	4	3.99	3	2.56	69.0%
Behaviour therapy (multimodal)	9	2.72	4	1.69	72.3%
Cognitive behaviour therapy	6	2.43	2	3.87	70.0%
Coping techniques	9	2.98	3	6.37	91.4%
Progressive relaxation	5	2.10	–	–	44.5%
Miscellaneous treatments	2	2.20	–	–	–
Placebo treatments	5	0.54	–	–	38.8%
Wait list/no treatment control	8	0.19	3	0.19	14.7%

Notes: k=number of treatment groups; ES=effect size.

Uncontrolled effect size (ES)

The within-group, uncontrolled effect size, was calculated of the most central self-report measure of dental fear or anxiety (in most cases the Dental Anxiety Scale) using the following formula as recommended by Feske and Chambless (1995) and Morris and DeShon (2002).

$$(M_{\text{pre}} - M_{\text{post}}) / SD_{\text{pre}}$$

The mean ES at post was 2.20 (SD 1.93, n=53) and at follow-up 2.93 (SD 2.09, n=18). A dependent *t*-test on those 18 treatment groups that had ES values both post and follow-up yielded the following post-treatment mean: 2.66 (SD 2.26) and a non-significant *t*-value (*t*(17)=0.96) indicating that the mean change at post-treatment was maintained.

Table 12.3 displays the effect sizes for the different treatment methods. The number of treatment groups (*k*) making up the ES values are so low that a statistical comparison between methods is not reasonable. However, it can be concluded that all the active treatments lead to very large ESs (2.10–3.99) whereas the control conditions only lead to moderate (placebo control 0.54) or very small (WLC/NTC 0.19) ESs.

Proportion managing dental treatment

The real test when it comes to dental phobia is whether the patient after the dental phobia treatment manages to go through dental treatment by an ordinary dentist. Some of the studies (mainly those that lack follow-up assessment) have assessed this issue directly in connection with the phobia treatment, whereas those studies doing follow-up assessment allow the patient to go through it sometime during the follow-up period. Since very few studies assess at both time points these are combined in the current analysis.

As can be seen in Table 12.3 systematic desensitization, exposure *in vivo*, behaviour therapy, cognitive behaviour therapy and coping techniques are clearly more effective (69–91 per cent) than placebo control (39 per cent) and WLC/NTC (15 per cent). The treatment that stands

Table 12.4 Controlled effect size (odds ratio and log odds ratio) on dental treatment.

<i>Comparison</i>	<i>k</i>	<i>OR</i>	<i>log OR</i>	<i>95% CI</i>	<i>z-value</i>	<i>Q-value</i>	<i>I</i> ²
CBT vs. all comparison groups	30	3.7	1.41	1.07;1.74	8.26****	32.9	2.7
CBT vs. placebo conditions	10	3.7	1.32	0.59;2.04	3.57****	11.7	22.8
CBT vs. WLC/NTC	9	15.0	2.71	1.74;3.67	5.50****	4.4	0.0
CBT vs. pharmacological Tx	4	3.6	1.27	0.65;1.89	4.02****	2.2	0.0

k = number of treatment groups, Q and *I*² are measures of heterogeneity; *****p* < 0.0001.

out is coping techniques with 91 per cent of the patients managing regular dental treatment. Overall 73.2 per cent of the patients who received an active cognitive behavioural treatment fulfilled this criterion. One interesting question is if there is a difference in dental treatment completion if the test entails seeing an ordinary dentist in the community (15 studies) or a specially trained dentist at the fear clinic (three studies). In the former group 72.5 per cent and in the latter group 77.7 per cent managed to go through dental treatment, a non-significant difference.

Odds ratio and log OR

Table 12.4 shows the odds ratio and log OR for the comparison between CBT and the different comparison groups. It shows that patients receiving CBT had more than three times as high a chance to complete regular dental treatment as had patients in all comparison groups, in placebo conditions and in pharmacological conditions and 15 times the chance of patients in waitlist or no treatment control groups. The ESs (log OR) were all very large and significant at *p* < 0.0001. Heterogeneity analyses showed that Q-values were non-significant and *I*-squared small. The log OR in the group of studies using community dentists was 1.46 (95% CI 1.06;1.88, *z* = 6.79, *p* < 0.0001) and in those studies using fear clinic dentists 1.18 (95% CI 0.57;1.78, *z* = 3.80, *p* < 0.0001) a non-significant difference. Thus, contrary to expectation the ES was somewhat higher for the studies using a more difficult test situation (ordinary community dentists).

Controlled ES

The calculation of controlled ES was done using the Comprehensive Meta-analysis programme (Biostat 2006). The following formula was employed:

$$\left(M_{\text{treatment group}} - M_{\text{comparison group}} \right) / SD_{\text{pooled}}$$

To correct for small sample sizes Cohen's *d* was transformed to Hedges' *g* before the mean ES was calculated. The controlled effect sizes are displayed in Table 12.5. The overall ES was large and so were the CBT vs. placebo and CBT vs. no treatment, whereas the CBT vs. pharmacological treatment almost reached the 0.80 limit for a large ES. As could be expected comparisons between two active CBT interventions yielded a small ES. The heterogeneity analyses showed non-significant Q-values and only one comparison with a moderate *I*-squared.

Table 12.5 Controlled effect sizes across all measures.

<i>Comparison</i>	<i>k</i>	<i>ES</i>	<i>95% CI</i>	<i>z-value</i>	<i>Q-value</i>	<i>I²</i>
CBT vs. all comparison groups	18	1.20	0.97;1.43	10.24****	18.2	6.8
CBT vs. placebo conditions	9	1.03	0.69;1.37	5.95****	9.5	16.0
CBT vs. WLC/NTC	9	1.38	1.06;1.69	8.56****	6.3	0.0
CBT vs. pharmacological Tx	4	0.79	0.35;1.23	3.52****	6.9	56.8
CBT1 vs. CBT2	15	0.25	0.07;0.44	2.65**	15.9	11.7

k = number of treatment groups, Q and I^2 are measures of heterogeneity; ** $p < 0.01$; **** $p < 0.0001$

Table 12.6 Controlled effect sizes CBT vs. all control conditions divided on type of measures.

<i>Comparison</i>	<i>k</i>	<i>ES</i>	<i>95% CI</i>	<i>z-value</i>	<i>Q-value</i>	<i>I²</i>
Self-rating of dental anxiety	17	1.27	1.02;1.53	9.72****	19.9	19.6
Behavioural approach test	4	1.59	0.88;2.29	4.41****	11.6**	74.1
General fear surveys	4	0.46	0.01;0.91	1.99*	2.5	0.0
General anxiety inventory	2	0.31	-0.44;1.06	0.81	0.1	0.0

k = number of treatment groups, Q and I^2 are measures of heterogeneity; * $p < 0.05$; ** $p < 0.01$; **** $p < 0.0001$

Analyses of the overall effect sizes divided on the main types of measures are presented in Table 12.6. The highest ES was obtained for BATs, which also had a significant Q-value and a large I^2 -squared. Self-rating of dental anxiety also yielded a large ES, whereas ES was small both for general fear surveys and general anxiety inventories.

Publication bias

In meta-analyses it is always necessary to consider the file drawer problem, i.e. that there are a number of non-significant RCTs that researchers did not manage to get published and if these were included the ES would not be significant. This issue was analysed for the log OR (ES for proportion managing to go through regular dental work) in two ways. The classic fail-safe N method showed that there has to be 448 non-significant studies to bring the log OR, which was 1.42 down to 0. Orwin's fail-safe method showed that it would take 175 non-significant studies to bring the log OR down to the trivial level of 0.20. Furthermore, a funnel plot indicated that there might be five missing studies to the left of the mean. If they were imputed the mean log OR would be reduced to 1.27, which is still a large effect size.

Long-term effects of CBT

It is obvious from the meta-analysis above that various forms of CBT lead to large and clinically significant improvements for patients with dental phobia. The logical question that follows is whether these good results are maintained in the long run. There are a couple of RCTs with long follow-up periods. Berggren (1986) presented a two-year follow-up of the Berggren and Linde (1984) study and found that the effects were for the most part maintained. For example, on the Dental Anxiety Scale (DAS) the behaviour therapy group had a

follow-up mean of 9.1 compared to the post-treatment mean of 7.7, a non-significant difference. Willumsen and Vassend (2003) published a five-year follow-up of the Willumsen et al. (2001) RCT. They reported that for the applied relaxation group the mean DAS score had increased from 8.1 at post to 9.9 at follow-up and for the cognitive therapy group from 9.3 to 10.9. None of these differences were significant.

There are two uncontrolled studies reporting 10-year follow-up results. Hakeberg, Berggren and Carlsson (1990) reported the 10-year follow-up of 14 dental phobia patients, half of which had received systematic desensitization. Their mean DAS score showed a non-significant increase from post-treatment (8.0) to follow-up (11.0). However, 100 per cent of the SD-treated patients had received regular dental treatment during the 10-year period since their phobia treatment. Davies, Wilson and Clements (2011) also reported the 10-year follow-up for 19 of the 20 patients who had received brief CBT, adapted from De Jongh et al. (1995) and Öst (1989). They found that none of these patients 'who were successful in having dental treatment without IV sedation ten years ago, had required subsequent IV sedation' (Davies et al. 2011, p. 160). They did not, however, report any self-rating data from the patients.

The tentative conclusion that can be drawn from these four studies is that the initially good effects of CBT to a large degree are maintained at follow-ups 2–10 years later.

Summary and Conclusions

The total number of published studies fulfilling the inclusion criterion of being a randomized controlled trial was 22. Seven of them came from the USA, six from Sweden and the rest from six different countries. The treatment setting was a university department in 11 cases and a dental fear clinic in 10. The therapists who carried out the treatment were clinical psychologists in 11 studies and the combination of a psychologist and a dentist in five, whereas a dentist alone did the psychological treatment in three studies. The patients were recruited to the RCT via referrals to dental phobia treatment in 10 studies and media advertisements in nine. The number of patients per treatment condition increased gradually from 9.8 in the 1970s to 25.5 in the 2000s. As a consequence of the low number of patients in most studies the statistical power to detect a significant difference of a moderate size was low, only 29 per cent, which should be compared to the recommendation of 80 per cent.

The gender distribution showed a majority of women, 68 per cent, and the mean age across the samples was 33 with a mean duration of avoidance of dental treatment of 10 years. The most commonly used measure were various self-rating scales of dental fear or anxiety and whether patients after therapy managed to have regular dental treatment from an ordinary dentist. The treatment methods used for dental phobia were to a very large extent the same as has been applied for other phobias, e.g. systematic desensitization, exposure *in vivo*, behaviour therapy, cognitive behaviour therapy, coping techniques and progressive relaxation. The mean number of treatment sessions was 5.4 (range 1–10) and the dropout rate was 9.6 per cent. However, 44 per cent of the 50 treatment conditions had no attrition at all.

The meta-analysis showed that all the major CB treatments improved the patients to a very large extent (ESs 2.10–3.99) and on average 73 per cent (range 45–91 per cent) of the patients managed to receive regular dental treatment by an ordinary dentist after the phobia treatment and it did not matter if they went to an ordinary community dentist or a specially trained

dentist at the fear clinic. The controlled ES showed that CBT was highly superior to all comparison conditions, including no treatment, placebo treatment and pharmacological treatment. Follow-up assessments on average 12 months after the end of treatment show that the treatment effects are maintained. There are even four long-term (2–10 years) follow-up studies also showing maintenance of treatment effects.

The conclusion that can be drawn from the current meta-analysis is that there are a number of fairly effective CB treatments for dental phobia which yield results that are also maintained at short- and long-term follow-up. However, slightly less than three-quarters of the patients managed to go through regular dental treatment after their phobia treatment, which means that there is room for further improvement. We should not rest until a treatment yielding 100 per cent, or close to that, has been developed. Any new treatment also should be evaluated in various settings and with various samples of dental phobia patients. One interesting research question that has not been focused on so far is to compare treatments done by a psychologist, a dentist and a psychologist–dentist pair (as the Gothenburg model).

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Part III

Cultural Aspects, Prevention
and Future Research

Different Treatment Approaches in Different Cultures and Health-Care Systems

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Introduction

At this point in the book, the discussion of cognitive behavioural therapy (CBT) for the treatment of dental phobia has focused primarily on its use in Western countries such as Norway, Sweden, the Netherlands, the United Kingdom and the United States. Indeed, much of the research in this therapeutic modality for dental phobia has come from a Western perspective. However, to conclude that dental phobia and, in turn, its treatment are unique to Western culture is to ignore a significant barrier to adequate oral health care across the world. This chapter will review some of the literature on dental phobia in non-Western countries and then discuss cultural considerations in applying CBT to dental phobia within these countries. A brief review of providing such therapy in different health-care systems will be made, followed by a discussion of alternatives to CBT that may be used to treat dental phobia.

Dental Fear and Phobia in Non-Western Countries

Asia and India

Dental fear in China, which has been assessed through Chinese versions of the Modified Dental Anxiety Scale (MDAS; Yuan et al. 2008) or the Dental Anxiety Inventory (Ng, Stouthard and Leung 2005), has both similarities and differences to patterns of dental fear in Western countries. In a comparison of samples of adults in China and Denmark, dental anxiety scores were significantly higher in the Chinese and the proportion of Chinese adults reporting moderate to phobic dental anxiety (30 per cent) was twice that of the Danes (15 per cent; Schwarz and Birn 1995). Among dentate adults in Hong Kong, high levels of dental fear were

associated with poor oral health quality of life (Ng and Leung 2008), consistent with numerous other studies in Western countries linking dental fear with poor oral health quality of life (for example, Gisler et al. 2012).

Studies of dental fear in India have found differences by class in the impact of fear on dental treatment seeking (Garcha, Shetiya and Kakodkar 2010). Adults in lower classes were more likely to avoid dental care due to fear of consequences of dental treatment (e.g., loss of vision after tooth extraction, loosening of teeth after scaling) than those in higher classes. Using Indian translations of the MDAS and Modified Dental Beliefs Survey, Acharya (2008) found higher levels of dental fear in younger adults, those with lower levels of education and those with unpleasant dental experiences, similar to other studies in more Western countries.

Middle East

Berggren, Pierce and Eli (2000) compared motivation for seeking treatment for dental phobia among fearful adults in Sweden, the USA and Israel. Compared to Sweden and the USA, fearful individuals in Israel were more interested in pursuing active forms of treatment, such as CBT and were more motivated to pursue such treatment in order to manage their fear, rather than seeking only pain relief. Meanwhile, in Saudi Arabia, a study of dental fear both in patients seeking dental and non-dental health care, those seeking non-dental care reported more dental fear yet fewer chronic dental problems than those seeking dental care (Al-Khodair et al. 1996).

Africa

Agbor and Naidoo (2011) interviewed traditional healers and their patients in Cameroon regarding their collaboration with and treatment seeking from oral health providers, respectively. They found that only 6 per cent of patients needing dental care are referred to an oral health specialist by traditional healers. Further, only 6.5 per cent of the patients sought treatment at a dental clinic, whether through referral or treatment seeking on their own. Fear and suspicion of dental clinics were identified as reasons for not seeking care in dental clinics, along with the higher cost compared to treatment by a traditional healer. A study by Udoeye, Oginni and Oginni (2005) in Nigeria found higher levels of dental fear in individuals undergoing endodontic therapy, followed by extractions. The overall level of fear measured by Corah's Dental Anxiety Scale, however, was lower in this sample (means between 7 and 9 on the 20-point scale), despite high levels of dental avoidance in Nigeria.

Brazil

In a study in Brazil by De Oliveira and colleagues (2006), mothers were asked about their children's resistance to receiving dental treatment. Along with the children's temperaments and the parents' abilities to ensure their children's cooperation with treatment, many mothers acknowledged their own distrust of dental care and unwillingness to accept dental treatment themselves. Further, a qualitative study by Nations and Nuto (2002) found a significant amount of distrust in dental professionals, who are seen as dismissive of trusted traditional healers. Further, key informants reported, 'Poor parents are not only barred from clinics but are blamed for children's rotten teeth' (p. 229).

Dental phobia and distrust of dentists, therefore, is certainly not limited to Western countries. While CBT is the most commonly used therapeutic approach for dental phobia in Western cultures, the same may not necessarily be true in other countries. As stated by Patel and Sumathipala (2006), 'A key problem in translating this evidence [of the effectiveness of CBT] cross-culturally is the assumption that the underlying cognitions are essentially similar in Western and non-Western cultures and that the concepts underpinning CBT will be valid in different cultural settings' (p. 57). This assumption must be taken into consideration prior to engaging dentally phobic patients from non-Western cultures in CBT.

Considerations for CBT in Non-Western Cultures

Patel and Sumathipala (2006) argue that CBT may be successfully adapted for use in developing countries 'by simplifying the content so that it can be applied in primary care by non-specialist health practitioners; using culturally appropriate analogies; and delivering the intervention over fewer and shorter sessions' (p. 54). In some countries, mental health services are significantly limited and are used primarily for the most severe forms of mental illness. For example, Schulz, Huber and Resick (2006) noted that in the former Yugoslavia, mental health services were primarily reserved for individuals with schizophrenia. Upon arriving in the USA, Bosnian refugees were reluctant to seek therapy for psychological distress because, in their words, 'only crazy people saw a psychiatrist back home!' (Schulz et al. 2006, p. 312).

Individuals from cultures where CBT and other therapeutic interventions are reserved only for the severely mentally ill are likely to feel very reluctant to seek 'therapy' for dental phobia, for to do so would be to label themselves as profoundly mentally ill. Instead, dentists and dental staff working with such individuals – or any individuals hesitant to engage in what they perceive as traditional therapy – may approach the topic as teaching the phobic patient ways in which to make the dental procedure more tolerable. Rather than introducing CBT or a similar intervention as 'therapy', the provider may ease the patient into using adaptive physical coping skills (e.g. deep breathing, muscle relaxation) to initially reduce autonomic arousal prior to beginning to address faulty cognitions.

Lin (2002) notes that CBT can be well suited for use with Chinese patients, as these individuals tend to value shorter term, more directive therapy approaches to indirect, insight-oriented approaches. CBT therapists engaging with Chinese patients are advised to take a very active role in suggesting problem-solving and coping skills. However, the Chinese culture focuses more on external sources of control than internal control and thus encouraging a Chinese patient to increase his or her own internal sense of control may be met with resistance. Further, management of dental phobia often includes encouraging patients to actively communicate their fear or discomfort through a hand signal during treatment. Asking a patient to stop a dental procedure due to pain or fear is likely to be seen by the patient as an affront or insult to the dentist and may result in the patient 'losing face' to the dentist and staff. Dentists or therapists working with Chinese patients are advised to watch patients' body language for signs of discomfort or anxiety, then stop the procedure (presumably for a dental-related reason) and 'check in' with the patient in a non-confrontational way. As the Chinese culture is more collectivistic in nature than Western cultures, engaging the family and other support systems will be important in treating these individuals (Lin 2002).

While research on the use of CBT in anxiety disorders within Indian culture is limited, Garcha et al. (2010) identified barriers to receiving professional dental care in India. Similar to the collectivistic Chinese culture, a significant proportion of respondents (18 per cent in the highest social class, 22 per cent in the lowest) reported that they would not attend a dental appointment alone, but would wait for treatment until friends, family, or neighbours could accompany them. Many respondents indicated that they would seek dental treatment only when the pain becomes unbearable (48–66 per cent) and the majority of respondents reported that they would not like to go to a dentist who does not have specialized qualifications (82–98 per cent). Therefore, when working with dentally phobic patients from India, it is recommended that providers include family and others from the support network in treatment and to reinforce the providers' training in both dental and anxiety management skills. As some patients may come into treatment with the assumption that dental care is meant only for treatment of pain, discussion of preventive treatment may be needed. However, this same study (Garcha et al. 2010) found that a significant proportion of respondents across social classes did not want to have scaling and polishing done for fear it would loosen their teeth (14–48 per cent). Therefore, focusing on early treatment of pain (e.g. just when the tooth starts to ache a bit, rather than become unbearable) may be the best way to engage individuals who hold these beliefs in treatment initially.

Similar to the use of CBT in Indian culture, research on the use of CBT and other therapeutic modalities with Muslim patients is limited. Hodge and Nadir (2008), however, note that cognitive therapy tends to be more consistent with the values and norms of the Muslim culture than are other therapeutic modalities, such as psychodynamic therapy. The authors point out that, while not all Muslims follow the religious teachings of Islam, being aware of the Islamic traditions is critical when working with Muslim patients. Similar to the previous discussion of Chinese and Indian collectivist cultures, Hodge and Nadir note that many Muslims place higher importance on the community than on the individual. Therefore, cognitive restructuring approaches that include 'I' statements are not likely to resonate with Muslim patients. Research has shown that CBT that incorporates Islamic teachings brings about more rapid symptom improvement in the treatment of Muslim patients with anxiety disorders (Azhar, Varma and Dharap 1994). Understanding the nature of the Muslim patient's Islamic faith, if applicable, is critical to engaging in appropriate and effective CBT.

Providing CBT in Different Health-Care Systems

Dentists in most countries, pursuing a surgical specialty of medicine, have traditionally seen dental maladies as acute rather than chronic. In the past this was largely true but in developed countries today the problems are more chronic and impact only a subset of the population. Such individuals benefit from regular periodic care and long-term management. Within this group of special patients are those who are phobic or are afraid of the dentist in addition to having other significant mental health problems.

Pharmacological management, in which patient's normal responses are obtunded, works well for acute care. However, in the sedated condition, fearful patients learn only to have acute care with pharmacological means and are less likely to enter into a care programme with a longer term horizon than patients who are treated with the behavioural approaches advocated in this book (Berggren and Linde 1984). In what might be termed a transition period within the field,

many phobic and mentally ill patients prize pharmacological treatment – the knock-me-out approach – because they and often their dentists are not aware of the alternatives.

In a study in the UK, a third of patients referred to a specialty service for sedation chose behavioural treatment when given the opportunity (Boyle et al. 2010). Nevertheless, this acute care model persists and on the surface it appears to involve less money and time than a behavioural approach. In a review of outpatient-based sedation, Yagiela (2001) exemplifies this kind of logic. He writes, ‘Although behavioural strategies are clearly more cost-effective for the patient receiving routine dental care, in-office sedation is usually the least expensive alternative for patients requiring pharmacologic management’ (p. 1348). By necessity, successful behavioural therapies do require upfront expenditures of time and money. In an interesting experiment with Norwegian fearful patients, Halvorsen and Willumsen (2004) found that the uncertainty of the outcome with behavioural treatments led most to not be willing to pay for behavioural therapy. Indeed the benefits of sedation are seductive from this point of view.

For dental patients with significant pathology, a combination of approaches – as Yagiela is suggesting – may be cost effective and perhaps patients may be more willing to pay for them. One can argue that there are some dental treatments that are so unpleasant or time consuming that no patient should experience them awake. At the same time, failure to teach such patients the skills they need to cope with routine maintenance care results in the perpetuation of the acute care model that we know is wasteful and, more often than not, unsuccessful.

Because most care centres have not offered combined or coordinated treatment the acute model has predominated. Thus these chronically ill patients do not return for regular care and their problems multiply resulting in greater expense and difficulty in management. Meanwhile, they suffer significant decrements in oral health quality of life. In many cases, dentists are not trained or permitted legally to use sedation in dental practice or may not use itinerant anaesthesia providers to provide sedation in private offices with the exception of surgical specialists. Hospital care is often limited to oral surgery with little opportunity for comprehensive care approaches.

The Scandinavian countries with extensive governmental programmes for dental care for special populations and children provide or pay for treatments that reduce fears. Criteria include a DSM-IV diagnosis of phobia or post-traumatic stress disorder (PTSD), a long period of avoidance and high need for treatment. Evaluations by dentists and psychologists are required. Similarly, residents in the UK may qualify for both psychological treatments and/or sedation based on referral from general practitioners or the community dental service. However, in all these countries the actual availability of services varies because of lack of trained personnel in some areas. The Finnish insurance system includes some subsidy for patients needing sedation but not behavioural treatments. Some behavioural treatments have been available on a limited basis from the public health system.

The Netherlands government has an insurance system for subsidized fear treatment in centres for special care dentistry when treatment in general practice is not possible. The preferred approach is cognitive behavioural treatment although sedation can also be available. The government programme does not cover general anaesthesia provided by private clinics. Nevertheless, these options are generally not available in other parts of the world.

In most other developed countries – the USA, Canada, Australia, Israel, for example – dental care is paid for mostly out-of-pocket with some private insurance coverage for adults and children and public insurance for poor children. In these countries, the primary focus of care for fearful patients is sedation or general anaesthesia. Generally, behavioural psychology

and psychiatric services are provided by separate systems with little connection to the dental care delivery system.

As CBT may not always be feasible within different cultures and/or health-care systems, it is useful to consider other therapeutic options with which dentally phobic patients may be treated. The following section will describe intravenous (IV) sedation, use of d-cycloserine to enhance therapeutic learning, computerized therapy approaches and approaches that focus on memory, relaxation and learning.

Alternatives to Face-to-Face CBT for Dental Phobia

Computerized CBT

Since the mid-1990s, computer-guided exposure therapy has proven successful in reducing phobic anxiety by helping patients create an exposure hierarchy, instructing them to imagine hierarchy situations, relax, plan and do homework and rating anxiety during each task done (Anderson, Jacobs and Rothbaum 2004). Advances in technology have expanded the value of computers in exposure-based therapy. Use of computer-based CBT allows individuals to access therapeutic resources who might otherwise not be able or willing to do so due to fear of stigma, geographical distance from resources, or a lack of trained therapists (Titov 2007).

CARL (Computer Assisted Relaxation Learning) is a computerized, exposure-based therapy programme for the treatment of dental injection fear (Coldwell et al. 1998). CARL presents to the patient a videotaped exposure hierarchy for dental injection fear and presents scripts to a dentist or hygienist to use while working with a patient. As CARL is self-directed, the programme itself trains the user both how to use it and how to complete behavioural self-assessment tests. Through videotape modelling scenarios, CARL trains participants to do physical and cognitive relaxation and to do graded exposure and gives feedback on the helpfulness of each therapy component. CARL's effectiveness was evaluated in 144 adults as part of a larger randomized controlled trial (Coldwell et al. 2007). Dental anxiety scores fell significantly compared with baseline at follow-up 12 months later. Eighty-nine participants (69 per cent) had visited the dentist since completion of the study. The automated therapy was clearly effective. CARL was originally devised for patients in North America and the current investigators have devised a UK version reflecting different practices and terminology.

Relaxation

The physiological components of dental anxiety such as increased heart rate, breathlessness, muscle tension and perspiration can be managed effectively through relaxation techniques, which are often used as part of a CBT protocol. For example, many people begin to breathe rapidly when anxious, which may make them feel dizzy. This sensation of dizziness can make them more anxious and breathe even faster, which can in turn increase feelings of anxiety even further. 'Controlled breathing', typically used as a supplementary technique in CBT when the patient is breathing rapidly, is a relaxation technique whereby patients are asked to breathe slowly and deeply in a steady rhythm (e.g. by counting as they breathe in and out) and by using their diaphragm (rather than muscles at the top of the chest and shoulders). This can regulate breathing and in turn reduce anxiety.

Another relaxation technique commonly included in CBT is progressive muscle relaxation. This relaxation exercise involves focusing on groups of muscles, which are first tensed for a few seconds and then relaxed, before moving to the next muscle group until the whole body is relaxed and the patient feels at ease. Relaxation is a skill like any other which needs to be learnt and takes time and practise in order for a patient to become proficient. While training patients in these skills is relatively simple and efficient in the dental office, regular practise at home is critical for patients to be able to use these skills effectively during dental procedures. Providers may need to coach patients in the use of these skills, particularly when first beginning treatment.

Distraction

Focusing a patient's attention away from a distressing procedure or situation is the purpose of distraction. The patient may be instructed to focus on a part of their body other than their mouth (e.g. asking the patient to raise his/her leg in the air) or to focus on something unconnected to themselves or the situation. For instance, distraction techniques can include listening to music, playing video games or watching a TV screen, or carrying out a mental exercise (e.g. counting backwards from 100, solving mathematical problems, making lists, remembering details of happy events). Distraction is a useful technique for short procedures. It is limited in utility, however, for longer situations as it would be difficult to continue to concentrate on the distracter.

There is evidence that both distraction and relaxation are effective techniques in reducing dental anxiety in adults and children (Corah, Gale and Illig 1979; Lamb and Strand 1980). A fairly recent study (Lahmann et al. 2008) involved a randomized controlled trial to compare a brief relaxation technique, to distraction (listening to music) and a control group (who did not learn relaxation or listen to the music). Lahmann and colleagues (2008) found that relaxation and distraction reduced anxiety compared to the control group. The relaxation appeared to be more effective in reducing dental anxiety for individuals who were highly anxious. Distraction appeared to be effective for those adults who were moderately anxious.

Increasing control and predictability

When a patient feels out of control and unable to stop a dental procedure, feels uncertain as to what could happen or fears the 'worst' will happen, or experiences an unexpected event (e.g. pain, sounds, sights), dental anxiety is likely the result. Conversely, the dental provider can reduce this anxiety by increasing a patient's perceptions of control and providing information to minimize uncertainty and allow preparation for dental procedures.

To increase patients' perceptions of control, dentists can encourage patients to use stop signals whereby the patient can signal the dentist (e.g. by raising their arm or pressing a button) to stop what the dentist is doing. The use of stop signals has been demonstrated to decrease dental anxiety (Corah 1973). Furthermore, just learning that stop signals are available is enough to reduce anxiety. Jackson and Lindsay (1995) gave patients a leaflet outlining the use of stop signals. They found that patients who read this leaflet (as opposed to a leaflet recognizing that some people are anxious about visiting the dentist) had lower levels of anxiety. A patient's perception of control can also be enhanced by giving patients choices, no matter how minor they appear. For instance, patients may be able to choose which procedure to begin with, how long the procedure will last until a break, or whether to listen to music or watch a movie.

Tell–show–do

One way of reducing uncertainty and increase predictability is to use the ‘tell–show–do’ technique. This involves an explanation of what is about to happen, what instruments will be used and the reasons for this (‘tell’ phase), followed by a demonstration of the procedure (‘show’ phase). The ‘do’ phase is then initiated whereby the procedure is carried out. This is frequently used with children but can also be useful for adults. Despite its popularity amongst dental professionals the ‘tell–show–do’ technique has not received very much research into its effectiveness (Kent and Croucher 1998).

Information

Information can dispel misconceptions that may be contributing to dental anxiety and increase predictability of the events during a dental appointment. Research on the effects of preparatory information, such as explaining what will happen at the dental appointment, has produced mixed results. Folayan and Idehen (2004) found no effects of preparatory information on dental anxiety in children. Similarly, a paper by Olumide et al. (2009) found no effects of preparatory information on dental anxiety. The lack of effect of information found in these studies may have arisen because there are different types of preparatory information. For instance, sensory information provides warning as to the sensations the patient is likely to experience whereas procedural information details the sequence of events that will (or may) occur. The mixed effects of information provision may also have arisen due to differences in the timing of information provision (too soon or too late), the amount of information (i.e. too much or too little) or personality factors (some patients do not want to receive detailed information) (Kent and Croucher 1998).

Modelling

Modelling is the term used to describe the form of learning whereby an individual learns how to perform or act via observing another individual and is part of the CBT (see also Chapter 12). Just in the way that dental anxiety can be learnt via observation, dental anxiety can be reduced via observing a non-anxious patient. Thus, observing an individual successfully receive dental treatment without pain, distress and anxiety can help reduce dental anxiety in the observer. Weinstein and colleagues (2003) found that children viewing a two-minute video in which a dentist explains what a dental injection will feel like, as well as proposing a hand signal to stop the procedure, led to greater fear reduction in children aged 7–9 than a two-minute video of Disneyland. Modelling has been shown to work better if the model is live (sometimes called *in vivo*) rather than filmed. The similarity of the model to the dentally anxious patient (i.e. similar age and gender) is also important, presumably because it is easier for the patient to relate to the model. However, recent research has demonstrated that family members can also be effective models. Farhat-McHayleh, Harfouche and Souaid (2009) compared the effects of live modelling by mothers, live modelling by fathers and ‘tell–show–do’ for children entering the dental practise for the first time. They found that live modelling by mothers was most effective in reducing dental anxiety (as measured by heart rate monitors). The age of the child influenced the effects, with greater reductions in anxiety for older children.

Memory-revising approaches

The experience of visiting the dentist can be seen in terms of the environment and the interactions with health-care professionals playing a strong part in determining the individual's cognitive and emotional responses to the situation. Pickrell and colleagues (2007) demonstrated the effective use of memory-restructuring intervention in the management of dental anxiety. The intervention was composed of four components. Firstly, pictures taken previously of the children smiling during the dental procedure were shown back to each child as a visual reminder about the positive aspects of the dental experience. Secondly, the children were asked how they would explain to their parents how well they handled the dental appointment. Thirdly, the children were asked to recall a good example of their improved behaviour (e.g. 'I helped the dentist by keeping my mouth open wide'). This resulted in the final component, a sense of accomplishment. The distinctive feature of this intervention is the fact that it is employed *after* the dental procedure. This would help particularly in clinical situations where negative events occurred during the dental appointment (Pickrell et al. 2007).

Prevention

The above techniques focused on how to help patients who are already dentally anxious. Whenever possible, however, it is of course ideal to minimize the likelihood of a patient becoming anxious in the first place. By reducing the need for invasive treatments (e.g. restorative, extractions), the likelihood of a person experiencing an unpleasant event during their dental visit and therefore becoming anxious about future visits is also reduced. Adequate oral hygiene, water fluoridation and a good diet are recommended. While an in-depth review of anaesthesia techniques is outside the scope of this book, in the event of invasive treatment (or any type of appointment), dentists should use all available techniques to reduce pain. The dental environment should be seen as safe, with a trusting relationship and good communication between the patient and dentist.

Pharmacological Strategies

This section is written to increase recognition that the armamentarium for patient treatment would be incomplete if it included behavioural approaches alone. While the clinical techniques of using pharmacological agents are well described elsewhere and beyond the scope of this chapter, included is a basic review of the approaches and how they can be enhanced through combination approaches of conservative sedation, superb pain control with local anaesthesia and thoughtful behaviour therapy. General anaesthesia is not considered as no behavioural component is required and good evidence suggests that its impact on long-term fear and avoidance is minimal (Berggren and Linde 1984).

Nitrous oxide

Nitrous oxide and oxygen sedation may be the most widely practised form of anxiety reduction using pharmacological agents although some countries, for example France, may limit the use of 50–50 mixtures to hospital settings (Collado et al. 2008) and actual use data are non-existent

for most areas of the world. Concerns regarding the safety of nitrous oxide in ambulatory settings have been expressed in the Netherlands related to the safety of dental personnel (Maakes, Jonker and Turk 2006). The USA and a number of other countries require special training or registrations when using this agent. It is stated to be the second-most common form of sedation, after general anaesthesia, among paediatric dentist specialists (Wilson and Alcaino 2011).

Nitrous oxide anxiolysis is most effective and predictable when its use is paired with behavioural techniques such as discussed in this chapter (Weinstein, Milgrom and Ramsay, 1988) and in Chapter 11. The behavioural techniques facilitate acceptance of the nasal hood and the slow paced breathing necessary for the drug's effectiveness and enhance distraction. A short behaviourally oriented training visit for anxious children and adults allows the clinician to titrate the level of nitrous oxide and oxygen in absence of the anxiety caused by a procedural visit. This allows clinicians to employ a lower, safer concentration of nitrous oxide and to minimize the risk of side effects such as nausea and vomiting.

Oral premedication

Many patients, at least in the Western world, are familiar with oral anxiolytics such as diazepam. Indeed, fearful patients – many of whom have concomitant mood or anxiety disorders – may already be aware of them or actually taking them. Dentists are attracted to the newer agents, such as alprazolam or triazolam, because they are easy to administer and relatively safe when used correctly. They are often available as tablets but in some case, particularly for midazolam, may be available as a syrup. Some agents may allow a patient with anticipatory anxiety to get a good night's sleep before a dental visit. Others may be more appropriate for intra-operative sedation. Like the intravenous agents discussed below, they may afford a degree of retrograde amnesia. Beta blockers have also been used for a long time to treat performance anxiety and have some application with patients whose upset is primarily physiological (Heaton, McNeil and Milgrom 2010; Liu, Milgrom and Fiset 1911). These agents can be used in conjunction with nitrous oxide and oxygen, affording a level of sedation equivalent to single agent IV sedation in mildly anxious patients (Kaufman, Hargreaves and Dionne 1993). It should be noted, however, that many countries restrict the use of these prescription agents and there has been concern, particularly in the USA, that multiple drug combinations used by dentists for both children and adults are not safe (Dionne et al. 2006). The use of oral agents requires careful pre-operative assessment, safety monitoring and an escort post-operatively.

Intravenous sedation

Intravenous (IV) sedation is a commonly used conscious sedation technique for dentally phobic adult dental patients (Craig and Wildsmith 2007). The techniques typically employ short acting benzodiazepines alone or in combination with narcotics. IV has increased markedly since the publication of reports in several countries recommending it over general anaesthesia, especially in ambulatory or private office settings without the safety backup available in a hospital. At the same, many jurisdictions require dental clinicians to obtain special training and registrations in order to provide these services. As with nitrous oxide, a large number of countries restrict the application of this approach to acute care hospitals and

physicians. IV sedation has gained popularity with both dental providers (Boynes, Lemak and Close 2006; Hunt et al. 2011) and anxious dental patients (Allen and Girdler 2005; Baker et al. 2006; Chanpong, Haas and Locker 2005) in order to cope with more extensive comprehensive dental care. The drugs can produce retrograde amnesia where patients do not remember the dental treatment.

IV sedation and the behavioural techniques advocated in this book can be used in tandem. The behavioural treatment facilitates attendance and cooperation with cannulization. Sedation can be used to accomplish long or unpleasant procedures and can be followed by additional behavioural treatment than facilitates longer term adherence to preventive visits and simple operative visits (Kvale, Berggren and Milgrom 2004). This avoids the patients having repeated sedations, which are expensive and may be a poor use of scarce resources in countries where dental care is less available. Pharmacological agents alone do not treat the underlying source of anxiety and avoidance.

An added advantage of combining approaches is the potential to use smaller amounts and fewer numbers of drugs to gain the same effect. This is important because the very young and old and patients with special health-care needs, may not safely tolerate the drugs needed to obtund an uncooperative patient (Coulthard 2006). Although the risks of such treatment provided by skilled clinicians in well-organized facilities are low, minimizing the level of anaesthesia employed is professionally important (Standing Dental Advisory Committee 2003).

d-Cycloserine

In the past decade, there has been an increased interest in the potential use of d-cycloserine (DCS; Cycloserine, King Pharmaceuticals Ltd., Hertfordshire) to facilitate the reduction of dental phobia enhancing extinction learning in exposure-based treatment. DCS is an antibiotic used in the UK in the treatment of drug-resistant tuberculosis (Jastak, Yagiela and Donaldson 1995) and currently not listed in the formulary for the treatment of anxiety. At the glycine binding site, DCS is a partial agonist of the glutamatergic N-methyl-D-aspartate (NMDA) receptor that affects brain processes involved in fear, specifically in the amygdala (British National Formulary 2009).

It is important to note that DCS does not appear to make standard behaviour therapy more effective, nor does it act directly as an anxiolytic. Rather, it seems to expedite the reduction of fear and anxiety, making behaviour therapy more efficient and proceed more rapidly. This research suggests that administering DCS during a practice session prior to sedation treatment may help the patient decrease his or her fear more quickly than with exposure therapy alone. For example, patients may undergo a brief practice session, during which they 'rehearse' the placement of the cannula while practising relaxation strategies. Administration of DCS in conjunction with this rehearsal session would help expedite fear and anxiety reduction, leading to less fear and anxiety during the cannulization. A small randomized clinical trial using DCS in conjunction with CBT for panic disorder and agoraphobia found more rapid symptom reduction in the most severely ill patients (Siegmund et al. 2011), yet no difference in the efficiency of treatment for less anxious patients. Heaton et al. (2010) describe the potential use of DCS in conjunction with exposure therapy for dental phobia in more detail elsewhere.

Summary

CBT has been shown to be highly effective in the treatment of dental phobia. However, this therapeutic approach may not always be feasible for all patients. While dental phobia is not limited to Western cultures, use of CBT in its treatment may need to be modified to fit in with the cultural norms and values of patients from non-Western countries. Dental providers in many countries remain focused largely on the use of pharmacological agents which allow for treatment but provide little benefit in treating underlying fears. Attention should be paid to the role of family and other social support in the treatment of dental phobia, as well as how engaging in 'therapy' should be framed so as not to offend individuals from countries with a strong stigma against mental illness. In addition, not all health-care systems provide for CBT within the dental context and dentists and therapists may be limited in what services they can provide by financial and legal regulations. Alternative behavioural and pharmacological treatments may also be used on their own or in conjunction with CBT for the successful management of dental phobia. Providers must be sure not to apply a 'one-size-fits-all' approach to the treatment of dental phobia and must take patients' backgrounds, beliefs, preferences and resources into account to help ensure a successful treatment outcome.

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Further Readings

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Prevention of Dental Phobia

Erik Skaret and Magne Raadal

Aetiology as the Background for Prevention

The multi-factorial aetiology of DA is outlined in Chapter 4. From a clinical perspective the factors are presented in a model consisting of three groups: *personal factors*, *external/social factors* and *dental factors*. In most cases dental anxiety (DA) and dental phobia (DP) have their origin in childhood and adolescence (Öst 1987). Children and particularly preschool children frequently display normal fear reactions and behaviour management problems (BMP) when exposed to new situations in the dental chair. Dental anxiety and dental phobia develop over time in a vicious circle of avoidance of care, leading to poor oral health and to negative self-conscious evaluations (feelings of inferiority, shame and embarrassment) (Berggren 1984) (see also Chapter 1). The model from dental anxiety to avoidance and poor oral health has also received support in recent studies (Armfield, Stewart and Spencer 2007; De Jongh, Schutjes and Aartman 2011). In a Norwegian study the frequencies of missed and cancelled appointments increased almost linearly during the age period from 12–18 years (Figure 14.1). Dental anxiety is one major factor related to this behaviour (Skaret et al. 1999) and the group with avoidance behaviour has reduced dental health at the age of 18 years compared to the non-avoiding group (Skaret et al. 1999). This supports the model and indicates a huge potential for prevention of recruitment to the vicious circle of avoidance among children and adolescents. However, there are few studies exploring the different factors and their efficiency to prevent development of dental anxiety. There is need for research using improved sampling, measurements and statistical approaches and that are based on longitudinal designs (Zhou et al. 2011).

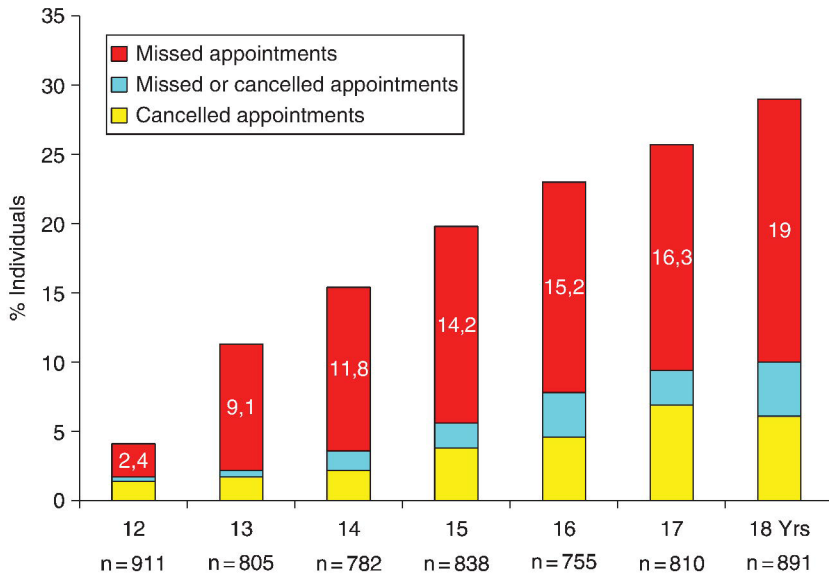


Figure 14.1 Distribution of individuals with one or more missed or cancelled appointments during the age period 12–18 years of age. Modified from Skaret et al. 1998

Dental vulnerability

The *personal factors* and *external/social factors*, outlined in Chapter 4, represent the child's individual vulnerability for being unable to cope with dental treatment. The child's development is influenced by family, culture and social background. The ability to cope with new tasks is a balance between the child's self-efficacy and the new challenges the child is facing, among these is dental treatment (Klingberg and Broberg 2007). To be able to diagnose a beginning avoidance behaviour and treat early signs of dental anxiety and BMP, we need to see the child in his/her total life situation. Some children are extremely robust in coping with new and challenging situations, whereas others are generally more vulnerable. It is a question about understanding the individual variations and adjusting for a possible mismatch between the need for treatment and the child's ability of coping.

Dental factors

The two main factors, as described in Chapter 4, are *painful dental procedures* and *lack of control*. Based on the fact that the acquisition of dental anxiety and phobia most often seems to follow the theory of learning by classical conditioning (Davey 1989; Öst and Hugdahl 1985), these factors are regarded as the most important unconditioned factors. The dental treatment with its elements of uncontrollable pain and unpredictability also supports the cognitive vulnerability model of the aetiology of fear (Armfield 2006).

The sensation of pain is complex, as described later in this chapter. It is not necessarily dependent upon tissue damage; it may also be generated by conditioned stimuli such as the sound and vibration of the drill, smell, the touch of the explorer and other instruments. This implies that the use of effective local analgesia alone may not be enough for the prevention of painful experiences.

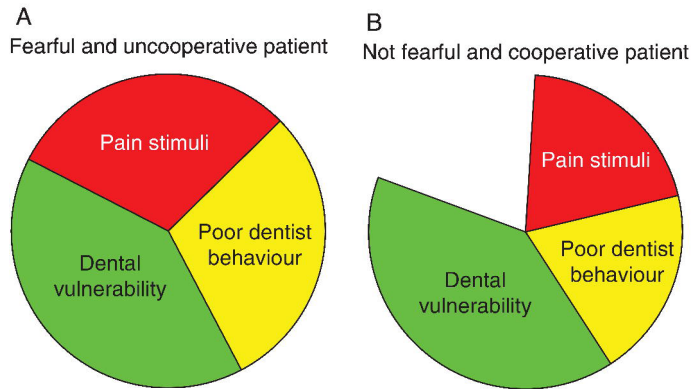


Figure 14.2 The figure illustrates the three major factors for a patient to develop fear and uncooperative behaviour in a dental situation. A: full circle means fear and uncooperative behaviour. B: partial circle means no fear and cooperative behaviour

Perceived lack of control may imply different aspects of the dental situation, e.g. insufficient information about the treatment procedures and the instruments used, feeling of being deprived the opportunities to stop the treatment if necessary and even lack of information and incitement to ask questions after the treatment. These situations typically occur when dentists are more occupied by accomplishing the dental treatment rather than taking care of the patient as a whole, being in a hurry and not communicating well with the patient.

Based on our knowledge about the influence of dental vulnerability and dental factors, as described above, a simple model for practical behaviour management is suggested (Figure 14.2). Since we are usually not able to change the personal and external/social factors (vulnerability) in the model, we must adapt the dental factors to the level of vulnerability since they represent a potential for prevention of behaviour management problems, dental fear and anxiety and dental phobia. In the two examples in Figure 14.2 (A and B) the patients' dental vulnerability is similar (same size of dark grey sector). In example A, the pain stimuli and the dentist behaviour have not been adapted to the patients' vulnerability (large black and light grey sectors), resulting in a totally filled circle, which illustrates generation of fear and uncooperative behaviour. In example B, the dentist has adapted his/her behaviour to the level of the patient's vulnerability and placed emphasis on minimizing the painful stimuli (small black and light grey sectors). The circle is therefore not totally filled and the patient is able to cope with the treatment.

Since present knowledge on the aetiology of dental anxiety and phobia is complicated, as outlined in Chapter 4, the simplified model in Figure 14.2 may be useful for practitioners during dental treatment of individual patients in order to prevent development of dental anxiety disorders.

Dentist Behaviour

Establishing rapport

Independent of which treatment approach is used, treatment of fear and anxiety starts with establishing rapport. A trusting relationship between the patient and the dental personnel is

basic both for prevention and treatment of dental phobia. General principles for good clinical communication, e.g. warmth, respect, empathic listening, autonomy and informed consent should guide every consultation with a patient.

The *Four Habits Model* is presented as an approach to the medical interview (Frankel and Stein 1999) and should be a guide also for the interview with the dental patient. The term *Habits* describes four patterns of behaviour, presented as: (i) Invest in the beginning; (ii) Elicit the patient's perspective; (iii) Demonstrate empathy; and (iv) Invest in the end. The first few moments of the encounter are key elements for establishing a trusting relationship and the verbal and non-verbal signals given here will often affect the outcome of the visit (Frankel and Stein 1999). This moment may often be ignored or underestimated as being preliminary to the 'business' of the interview and the dental personnel are often focusing on the dental treatment too early (Frankel and Stein 1999). The anamnestic evaluation should always include a question like 'Are you afraid of dental treatment?' or 'How unpleasant do you experience dental treatment?' 'Select a number on a scale from 1–10 that fits best for you, where 1 is not at all and 10 is very much'. A good response to a high fear rating could be that the dentist is giving comments and questions like:

- I have noticed that you don't like to go to the dentist?
- Many people have the same view.
- Is there anything we could do to make it easier for you?
- What is it you dislike the most?
- What is the worst thing you fear will *happen* when you are in that situation?
- I suggest that we spend some time talking about this and find ways of doing the treatment that makes it easier for you.

Meeting the Child and the Parent in the Waiting Room

A good practice would be that every new patient is met in the waiting room by the dentist or the hygienist, depending on who is going to do the dental exam. If the new patient is a child he/she should be met with the same respect and the same principles as for an adult patient. The meeting starts with presenting yourself and clarifying your role ('I am the dentist'), first to your child patient and then to the caretaker. The meeting in the waiting room may give lots of signs that will be helpful in the establishment of a trusting relationship. This moment is the start of a process aimed at establishing rapport and also the start of getting important information about the child and his/her life situation. Verbal and non-verbal signs may together provide such information – factors like personality, maturity, emotions and experiences. Children showing dental behaviour management problems may have a burdensome life and family situation (Gustafsson et al. 2007) and may give signals about parental style. Studies have shown that the child's behaviour towards adults varies according to different parenting styles and that the behaviour continues in the dental office and may influence the complicated patient–parent–dentist interaction (Aminabadi and Farahani 2008). Research looking at the relationship between authoritative, permissive and authoritarian aspects of the caregivers' parenting style and the child's reaction to restorative dental procedures has shown preliminary evidence for a significantly more favourable behaviour during the procedure for children of authoritative parents compared to children of permissive and authoritarian parents

(Aminabadi and Farahani 2008). The first meeting with the child and parent will provide valuable information for further communication. The psychologically more independent child of the authoritative parent has higher self esteem and will probably respond to the questions him/herself, whereas in other cases the same question more often will be answered by the parent.

Child and Parent in the Dental Clinic

The question whether or not the parent should accompany the child in the dentist's office is controversial, probably because there is no absolute yes or no answer. Generally it is reasonable for a small child to have the parent accompanying him/her into the dentist's room, especially if this is a new situation for the child, in order to reduce the child's general fear. In addition, it is necessary for exchange of information between caregiver and dentist about both parties' ideas of the situation. The parents have their own experiences with dental treatment. They have things they want to explain to the dental personnel. In addition the presence of the parents will give further indications about their parenting style and how the parent and child communicate. On the other side, the situation also allows the dentist/hygienist to present him-/herself and the treatment philosophy to the parents.

The conversation must include both the child and parent, as illustrated in Figure 14.3, in order to establish a trusting relationship with both of them. The figure shows the triangle of communication that will always exist and therefore must be considered. If, for example, the dentist has established an excellent communication with the child, but has neglected proper exchange of ideas with the parent, a possible negative attitude may be communicated from the parent to the child either during or after the session and the good relationship between dentist and child may be reduced. This means that we always have to 'play on the same team' as the parents. They will have their focus on the dental treatment needs and they have to be informed that the time needed for behaviour shaping is an investment for the future and not because their child is not brave enough.

These principles primarily apply to small children and the first treatment session(s). When a trusting relationship has been established with both child and parents, all parties usually appreciate that parents remain in the dental room. This is also often the case for older children and adolescents. There are, however, cases where it is preferable to depart from these major principles, e.g. when parents are interfering negatively with the treatment process and therefore must be dismissed. It is of major importance that this is done according to the rules of good

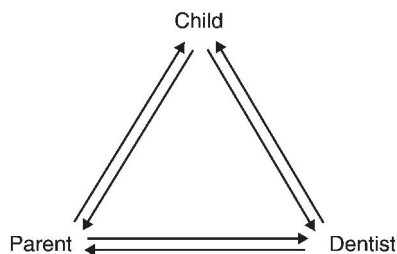


Figure 14.3 Communication triangle

etiquette in order to prevent the parent ruining a good relationship between dentist and child by negative communication with the child after the session.

Behaviour Shaping

Behaviour shaping should be introduced early and if possible during sessions of preventive dentistry where no invasive treatment is yet needed. The reason for this is that positive experiences in the dental chair seem to be favourable in making children able to cope with more unpleasant and painful experiences later (latent inhibition; Davey 1989). Clinically, this means that giving a child several positive experiences with no invasive treatment will help the child to cope with future treatment. It also means that starting dental treatment with an invasive treatment session, e.g. extraction, represents a risk of lack of coping in the future.

In cases with dental treatment needs beyond the child's coping capabilities, the treatment should be postponed (if possible) until necessary behaviour shaping or the child is more mature. The behaviour shaping must aim at introducing the child to actual treatment needs, including how the instruments work and their purpose. Based on the individual child's experiences and beliefs, the stimuli may be arranged in a stepwise fashion, in which each step represents a procedure or an instrument to be learned. The child will need time to explore and be familiar with the different instruments, and it is normal to be sceptical (Figure 14.4). Two examples of steps are illustrated in Figure 14.5, in which A is suitable for a young, inexperienced child to be examined for the first time and B is an introduction to the rotating instruments. After having explained the procedure to the child (and parent) in a comprehensive way, he or she is exposed to each stimulus in a sequence of potentially increasing fear. Each exposure is introduced by the use of the tell-show-do method. Before proceeding to the next stimulus the child must show positive acceptance in the present step. If not, the procedure must be repeated. The different steps must be adapted to the individual child and the situation.



Figure 14.4 To be sceptical is normal. Photo: Håkon Størmer, University of Oslo

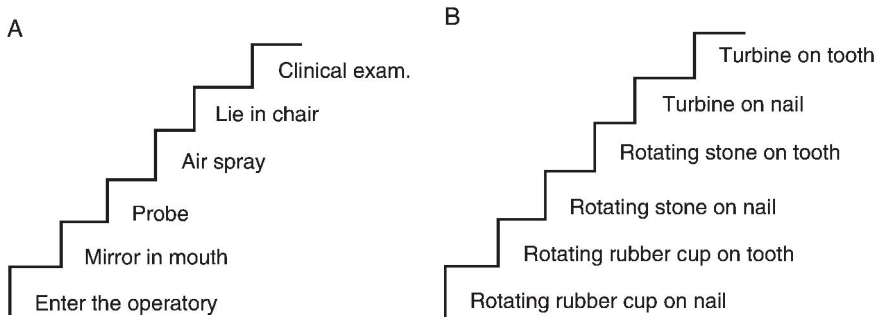


Figure 14.5 Behaviour shaping based on the exposure technique. A: Example of exposure steps for a child who is going to be clinically examined for the first time. B: Example of steps suitable for introduction to drilling

Introducing different instruments and procedures should also be done in situations where the child is curious and asking questions, even if the need for these specific instruments and procedures is not there yet. This child gives signs of need for information. For some patients the need for information is important and lack of response to their questions may increase the feeling of lack of control. These patients often like to look in the mirror. Having a hand mirror at their disposal gives a good feeling of control and being included in the ‘team’.

Cognitive Behavioural Therapy in Fearful Children and Adolescents

Cognitive behavioural therapy (CBT) is a treatment approach shown to be very effective in treatment of dental phobia in adults (see Chapter 10). However, the basic principles of CBT may also be useful for prevention of dental phobia in clinical practice. The average age of onset for dental phobia is estimated to be 12 years (Öst 1987) and the prevention of this disorder must therefore have a high focus in dentistry for children and adolescents. In a literature review (Davis, Ollendick and Öst 2009) the authors conclude that CBT in children and adolescents follows the same basic principles as for adults and the present evidence shows that even more intensive treatment (one-session treatment of specific phobias, see Chapter 9) in children and adolescents is both efficient and efficacious. The treatment of lower levels of anxiety should therefore follow the same principles as for a phobic patient. However, children and adolescents are in many ways different from adults. They are immature and still under development. The approach has to be adjusted according to age and their capability for abstract thinking (Davis et al. 2009). The more intensive treatment (longer sessions) must also be adjusted to the age and maturity of the child and to signs indicating that the child has ‘used up’ his/her available time for that day.

Children are often brought to treatment by parents and the motivation for treatment may be the parents’ rather than the patient’s. A good outcome of CBT in children is dependent upon the child’s own motivation for being treated for the fear and thereby being able to cope with ordinary treatment. The pre-treatment interview to find out what maintains the individual patient’s phobia should also focus on the child’s own motivation (Öst 2010; Svirsky and

Thulin 2010). To have a phobia may give secondary benefits that may decrease the motivation for phobia treatment. One example is a patient with intra-oral injection phobia where the future plan is orthodontic treatment including extraction of premolars. The injection phobia ‘protects’ against having to do extractions. In these cases it is important to tell the patient that teeth will never be extracted without his/her consent. This is independent of the ability to receive an injection.

The beliefs influence the subjective experiences of pain and anxiety

A patient’s fear response is often presented by three response systems: the physiological; the behavioural; and the cognitive/affective system (see Chapter 4). These responses will increase with higher levels of fear and become gradually stronger for anxiety and phobia compared to fear. To prevent anxiety or even phobia, it may be helpful for the dentist to have this model in mind. The physiological response is biological and functional in that it reminds us of a potentially harmful situation. The most frequent and strong response is increased heart activity and muscle tension while thinking of the dental situation (Hugdahl 1984) and during a dental examination (Öst and Hugdahl 1985). The patient’s interpretation of the meaning of this ‘motor’ (activation in the autonomic nerve system) is essentially related to whether or not he/she will have positive or negative thoughts when sitting in the dental chair.

Exploring the child’s’ negative thoughts

It is important for the dentist to explore the patient’s thoughts in the situation. What is the specific problem? As described in Chapters 9 and 10, the catastrophic beliefs are maintaining the avoidance behaviour. For children the catastrophic beliefs may be more unclear and more difficult to explore. They may also have another person’s beliefs as their own. Whatever the negative beliefs, they are never tested, and over time the avoidance makes the beliefs gradually stronger. For patients who are not yet phobic and still present in the dental clinic, it is therefore important to explore their thoughts and beliefs and show that we take them seriously and intend to deal with them.

The small child should be respected in the same way as adult patients. Emphatic listening to the story about their previous experiences gives them a feeling of being respected. However, the effect and outcome of CBT for dental phobia is not dependent upon the aetiology, as long as dental anxiety is the primary diagnosis (see Chapter 7). To explore the child’s thoughts about what may happen is, however, more important for the effect of the fear treatment.

Explaining the fear and the principles of gradual exposure

An anxious and avoidant child often has a history of many dental visits with a feeling of having ‘failed’, i.e. that the dental treatment couldn’t be accomplished or not completed. The dental treatment is usually regarded as the criterion for success of the patient, parents and dentist. This is a typical situation that should be prevented. A basic principle in CBT is to conclude a

session at a step where the patient, the parent and the therapist are happy because of the improvement that has been achieved, even if the progress is 'minimal'. This must be explained to the parents as an important principle of CBT and they must be encouraged to give their child credit and appraisal for being successful. They also need to experience that the child is stimulated and not forced into different steps of the exposure. This is therefore a typical example of a situation when parents should be present in the dental surgery. However, when both child and parents are confident with the procedure, the parents may very well leave the room. They are informed about creating a team as an important part of the fear treatment. They should be told that both the parent and child can give a signal if they want to get in contact during the treatment session.

The mechanism of fear and the principles of the treatment have to be presented according to the age and individual capacity of the child. Since a basic principle is the gradual exposure to the most fear-arousing stimuli, the child may experience this as difficult. The focus on teamwork between child and dentist is generally a good approach for children and to 'play' together and to help each other to reach small goals that qualify for praise and feeling of coping. In CBT for adults safety behaviours are removed, to help the patient understand that emotions like strong anxiety are unpleasant but not dangerous. The child will have problems understanding this difference. So for the child patient different techniques aimed at reducing the physiological activity should be used, e.g. blowing a 'windmill' and distraction techniques like singing, telling stories and playing with toys.

A usual CBT session for adolescents and adults lasts for one hour. Small children are limited in their ability to focus and one hour may be too long. They should therefore be given shorter appointments in which the exposure treatment is divided into smaller pieces. If there is need for longer sessions, e.g. in cases when the patient has a long way to travel, this may be solved by having breaks (Öst 2010; Svirsky and Thulin 2010).

The Complexity of Pain

It is unrealistic to go through life and never experience pain. Both in everyday situations and during dental treatment, some pain experiences are part of life and have to be confronted. However, pain is a subjective experience. The goal is not necessarily a totally pain-free treatment, but that the pain experience is within the individual patient's own coping ability. A seven-year-old boy who received a local anaesthetic injection for the first time was asked: 'How was it?'. The answer was: 'It hurt a little, but I can do this'. During treatment of injection phobia one patient responded to the question: 'Was the injection painful?' by 'Yes, I could feel some pain, but it was within my limit'. The goal must be to give the patient experiences that are within the individual limits; then the patient can cope with the treatment.

Painful dental treatment under coercion is a high risk situation for development of dental anxiety (pain combined with lack of behavioural control). There is comprehensive empirical evidence that previous experiences of pain during dental treatment are the main factor for both dental anxiety and BMP (Holst et al. 1988; Milgrom, Vignehsa and Weinstein 1992; Skaret et al. 2000; Veerkamp et al. 1992). Pain is defined by the International Association for the Study of Pain as: *An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage*. What does this definition mean clinically? Does it make it easier to understand the huge variation in individual pain reports

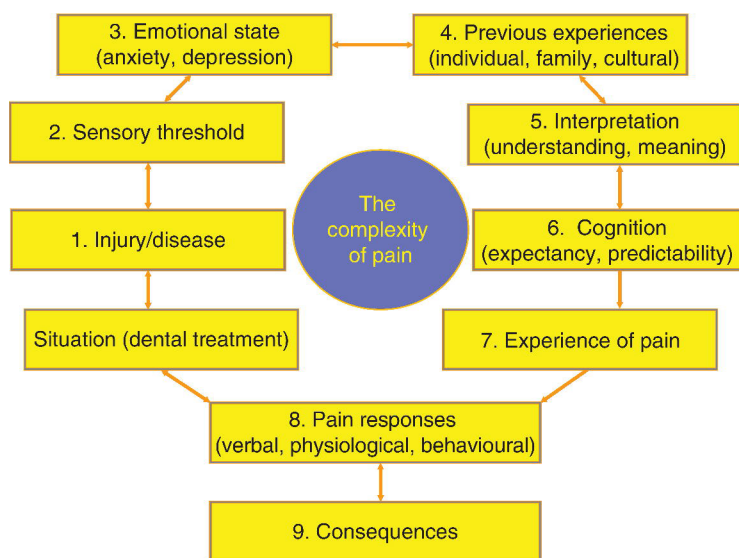


Figure 14.6 The complexity of pain model. Modified from Skaret 2001

after e.g. a dental injection in the same region of the mouth – ranging from ‘not painful at all’ to ‘I cannot stand the pain and I will not be able to do it again’?

Everybody knows that pain is an unpleasant sensory experience. However, the definition is also saying that the experience is emotional. This explains why fearful patients give higher pain ratings than non-fearful patients. That the experience of pain is associated with actual tissue damage is also well known, but the definition says that it is also associated with *potential tissue damage* or even *described in terms of such damage*. In conclusion, the definition is saying that the pain experience is influenced by a variety of psychological factors (see also Chapter 4). Let us try to implement the information given in the definition into a clinical setting and use it as a guide in our efforts to prevent the vicious circle of dental anxiety. How these factors can be modified may be summarized based on a pain model (Figure 14.6).

1. Dental treatment may represent a situation with invasive treatment due to injury/disease (e.g. injection, drilling and extractions).
2. When the sensory pain threshold is reached, a nociceptive pain signal will be sent to the brain. There is a huge variation in patients’ self-reports of pain (e.g. from a dental injection). This is not because the sensory threshold is so different, but because the subjective report is modified in different ways for each patient. The experience of pain is produced from the output of the brain, not from the sensory signal (Eli 2010) and the individual experience is the output of a widely distributed neural network in the brain rather than directly by sensory input evoked by injury, inflammation or other pathology (Melzack 1999). When the patient reports that a simple procedure is painful, then this is the truth.
3. The signal is interpreted based on the patient’s emotional state in the situation. Pain and anxiety are closely related (see Chapter 4). It is even argued that in an acute pain situation anxiety and pain may be indistinguishable (Litt 1996). Clinically this means that it is

important to stop the dental treatment and start treatment of the patient's anxiety in order to modify the subjective experience of pain during the treatment.

4. The emotions are again influenced by the previous experiences in the same or related situations. The probability of reporting procedural pain is higher for those reporting previous experiences of pain, those expecting the treatment to be painful and those reporting feelings of low levels of control (Maggirias and Locker 2002; Milgrom et al. 1992). These subjective individual experiences are also influenced by family and the patient's cultural background. Moore et al. (1998) found that ethnic differences in pain beliefs affect pain perceptions and perceived need for anaesthesia.
5. Previous experiences will influence the interpretation of the situation. The previous experiences of pain, lack of coping and lack of knowledge about the procedure will influence the motivation and the meaning of the treatment and influence the subjective experience of pain.
6. The cognitive constructs expectancy, predictability and perceived control, i.e. the belief of having at one's disposal a response that can influence the aversiveness of the event, is found to be a mediator of pain reduction (Thompson 1981). Self-efficacy (SE) is the belief of having the ability to organize and perform the behaviours necessary to achieve the desired goals (Bandura 1977). The measurement of *specific* SE, which is the belief of having one's own capability to achieve desired outcomes using a specific task, strategy, or technique to reduce pain or cope with a certain pain stimulus (Litt 1988), is found to mediate the relationship between pain intensity and disability and being predictive of pain tolerance and endurance (Arnstein 2000; Baker and Kirsch 1991; Litt 1996; Rokke et al. 2004). The independent influence of the two constructs – perception of control and specific SE – on the subjective sensory evaluation of pain has been tested in an experimental design (electricity to forearms) by Vancleef and Peters (2011). They concluded that beneficial effects of offering control over pain are influenced by whether or not the individuals are convinced that they are really able to exert this control (high SE). We ask the patient to give us a signal when they want us to stop. However, when the treatment has started, the non-verbal signals from the dentist may indicate that he/she would prefer no stop signals. Rehearsing makes the agreement about the stop signal more trustworthy and increases the SE. D: 'I will start doing the clinical exam. Could you just raise your hand during my examination, even if you do not need to stop? Then I know your signal and you will experience that I really will respond to it'.
7. The modifying factors in the model (3–6) will in sum determine the patient's experience of pain (1) in this specific treatment situation.
8. The patient will respond to the pain experience in a verbal, physiological or behavioural way, based on factors 3–6. Whether or not we use time to modify these factors related to the new pain experience will again decide the consequences that will be on a continuum from reduction of negative thoughts and increased feeling of coping to future avoidance of care.

Pain Control

Local anaesthesia

Invasive interventions in teeth and supporting tissue include tissue damage and thereby nociceptive pain stimuli. Local anaesthesia (LA) is an effective and safe method for blocking the

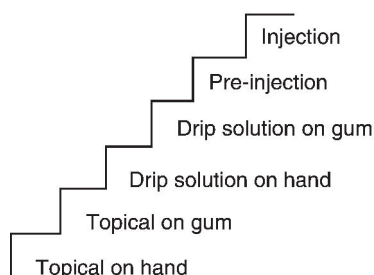


Figure 14.7 An example of behaviour-shaping steps for a child who is anxious of LA injections

stimuli from reaching the central nervous system and thereby the perception of pain. Introducing LA to children in order to make them confident with the technique is therefore of utmost importance for pain control during invasive dental treatment.

All children need some kind of information before an injection, but this must be adapted to their age and maturity. Small and immature children should usually be informed in a simplified way without too many details, possibly without seeing the needle, while older children frequently have a higher need for control and want more details. An example of a behaviour-shaping series of steps for children who are fearful of LA and are in need of control is illustrated in Figure 14.7. The principles are based on the tell–show–do method as described previously. The term pre-injection denotes that only the tip of the needle penetrates the mucosa in the area where the topical analgesic has been applied and a small amount (a drop or two) of the solution is injected. By making the area of injection numb, the periost in particular, the main solution can thereafter be injected without pain. Another advantage by doing the injection in two steps is that it reinforces the child's coping ability with the procedure.

The use of a topical analgesic agent is extremely important in reducing the pain of the penetrating needle. The most commonly used are lidocain (5 or 20 per cent) and benzocaine (20 per cent) as ointment or gel. It should be applied on dried mucosa for 2–5 minutes. A strong taste may be unpleasant for some children and care must be taken to prepare the child for it and prevent the use of superfluous amounts.

Most commonly used local analgesics for injection in Scandinavia are lidocain and articain, both with adrenaline with an analgesic duration of approximately 60 minutes. *Infiltration*, by which the local analgesic solution is applied near to the apex of the teeth, is more applicable to children than adults since the maxillary and mandibular bone plates are less dense and thereby permit a more rapid and complete diffusion of the solution. However, a *mandibular block* is usually needed in older children for permanent molars in the lower jaw. It is also maintained that a mandibular block is most useful for procedures in primary molars when there is need for anaesthesia in the lingual mucosa, because only one injection is needed for both teeth and mucosa.

In order to reduce pain and discomfort during injection, it is advisable to use thin (30G) instead of standard needles (27G) wherever possible, to inject slowly in order to reduce the pressure to the area and secure that the solution is at room temperature. *Computerized delivery systems* (e.g. the Wand®) may be useful for delivering the solution with constant and very slow speed and thereby minimal pressure.

In general, there are few side effects and complications following LA in children. Toxic effects are very rare and are usually due to intravascular, rapid injections. However, overdoses of the drug may occur in cases with too many injections and particularly in combination with other drugs. The most frequent side effect is insufficient pain-reducing effect of the LA. This is serious if not taken into account because it may ruin the child's confidence in painless dental treatment and make him/her more anxious. Before starting any invasive treatment procedures one must control that the LA is effective, if not more LA should be added.

Local Anaesthesia in Children with Blood-Injury-Injection (BII) Phobia Activation

Paediatric dentists should be aware that children with a genetic predisposition of BII phobia may experience an injection as very unpleasant because of the characteristic vaso-vagal response (decrease of blood pressure) (see Chapter 5). The next time they are in the same situation they may show avoidance behaviour: 'I don't want to have the injection'. This is not necessarily because the injection was painful. The reason may be because the injection elicited an unpleasant bodily feeling with a tendency of nausea and dizziness. Children with dental anxiety showing a strong anxiety response when exposed to an oral injection may in fact suffer from blood-injury-injection phobia. They may therefore need adjusted behaviour management techniques aimed at compensating for the reduction in blood pressure, for example the muscle tension technique developed by Öst and Sterner (1987) (See Chapter 10).

Dental anxiety may relatively often be connected with aspects of BII phobia, especially among girls (Vika et al. 2008). This may be important for the clinical fear treatment approach to dental injections. The children should be asked about their previous experiences of negative bodily sensations, including previous experiences in situations like vaccinations and other situations including needles and blood.

Patient Control

One way of describing patient control in a clinical way is to divide the concept into four categories: (i) Informational control; (ii) Cognitive control; (iii) Behavioural control and; (iv) Retrospective control (Thompson 1981). Informational control is the description of details, e.g. anatomy of the mouth, jaws and teeth; treatment procedures and instruments, e.g. how they look, what kind of function they have and how long the treatment will last. Knowledge about the anatomy of the mouth, jaws and teeth will help correct false beliefs about what could happen. In the case of sedation: 'What is the effect of the medication? How will the effect feel? Can I still communicate?'

Cognitive and behavioural control are in many ways linked to each other. Cognitive control is the control of negative thoughts starting before the appointment and will influence the anticipatory anxiety: 'I will not be able to manage. Will I experience the bad feeling again?'. Behavioural control is the opportunity to influence and control the procedures, e.g. to stop the treatment by raising one hand. This should also include the patient's control over the treatment options (autonomy).

Retrospective control means that the patient understands what and why things happened. The interpretation of pain and unpleasantness, sudden changes in physiological activation during dental treatment may be misinterpreted and end up with negative thoughts and catastrophic beliefs. One clinical example is when the dentist is giving local anaesthesia and notices that the patient turns slightly pale, giving non-verbal signals about unpleasant feelings. The dentist knows what happened, e.g. that some of the drug was given intravasally. If this is not explained to the patient the situation may create negative thoughts like: 'I felt my heart was running fast. Maybe I am allergic to the LA solution? Maybe I should avoid LA in the future? The dentist did not notice' (see Chapter 10).

All patients should be offered a treatment adapted to their level of coping and need for control. The treatment should be as non-traumatic and as painless as possible. The treatment procedures should be explained beforehand and the patient's subjective experience should be evaluated afterwards.

Pharmacological Methods

The major indications for conscious sedation with nitrous oxide or benzodiazepines as a supplement to the psychological treatment methods are uncooperative patients in need of acute dental treatment and/or extensive and complicated dental treatment needs (see Chapter 11). The aims of this combination between psychological and pharmacological methods are not only to solve the present treatment needs but also to enable the patient to cope with future dental treatment.

Dental treatment under general anaesthesia (GA) does not reduce the patients' dental anxiety in the long run (Berggren 1986; Hakeberg et al. 1993; Klaassen, Veerkamp and Hoogstraten 2008). Often, a patient who is put on the waiting list for GA has a risk of being categorized as a GA patient for the future. These signals from the dental personnel may give the patient the beliefs that his/her own lack of coping is not curable and that he/she has to be treated under GA in the future. To avoid this situation one should always include treatment of dental anxiety as part of the treatment plan for these GA patients (Klaassen et al. 2008; Lyons 2009).

Patients should be treated at the lowest level of risks and at the highest level of cost-effectiveness. A study in the USA has found a statistically higher risk for development of learning disabilities in children with several GA sessions at an early age compared to controls (Wilder et al. 2009). This also supports the use of GA to be limited to situations where the dental treatment needs are so extensive and/or complicated that the alternatives represent many treatment sessions with great mental and physical burden for the child. Are too many patients referred to dental treatment with GA because the dentists lack the sufficient competence in use of psychological methods for treatment of dental anxiety? The question should be raised, but so far there are no definite answers.

Aspects of Prevention in the Dental Health Service

A patient who is not coping with dental treatment enters a 'vicious circle' with more and more focus on the need for dental treatment. Then, when the child is referred to another dentist, he/she will experience the parents', as well as the dentist's, increasing focus on the need for

treatment: 'Now that you are referred to a new dentist, you have to manage the treatment and finally have your teeth repaired!'

Case description: 11-year-old girl

A mother called the clinic and asked for advice. Her 11-year-old daughter tried to be 'a good girl' and wanted so much to manage dental treatment. She had been sent from one dentist to another without being successful. This is what the mother said:

My daughter wants to be brave and is doing her best to cope with the treatment, but when the dentist starts doing the dental treatment she suddenly starts crying and does not manage. The treatment must be stopped and my daughter is unhappy and disappointed in her own behaviour. She has also been given an appointment with another dentist, but when he started to do the dental treatment the same thing happened. My daughter tried to be brave, but failed. Then she was referred to a dentist with license to use nitrous oxide sedation. When they were putting the nose mask on, my daughter panicked again and they had to stop. The dentist said: 'Now we have no more options to offer you. Come back when your daughter is able to handle the mask'. I think what my daughter needs is an appointment with somebody who has sufficient time and motivation to talk with her.

The case presented does not represent how dentists generally handle their patients. Most dentists working with children take good care of their patients. However, the focus on budgets, income for the clinic and efficiency is not a system that favours fearful patients who might have managed ordinary treatment if sufficient time had been invested in behaviour shaping and establishment of a trusting relationship.

Dental personnel should be aware of specific diagnoses that make the teeth very sensitive to dental treatment, e.g. severe molar incisor hypomineralization (MIH). These children often have to undergo repeated dental treatment at brief intervals, often undertaken without the use of local anaesthesia, and they have higher dental anxiety compared to controls (Jälevik and Klingberg 2002). These patients should be referred to specialists in paediatric dentistry for early assessment, and dental treatment should be with sufficient local anaesthesia and other pain/anxiety-reducing techniques, e.g. sedation.

The Role of the Dental Hygienist (DH) in Prevention and Treatment of DA and BMP

In Norway the Bachelor's Degree in Dental Hygiene is a three-year programme including courses in dental care, clinical dentistry, basic sciences, dental health and social and behavioural sciences. In addition to the dental assistant the DH is the person most often seeing the small child and their caretakers when they are visiting the dental clinic for the first time at the age of 3–4 years. A major focus in DH education is health promotion and preventive dentistry. They introduce the child to the dental environment including clinical exams and intra-oral X-rays. When invasive dental treatment is needed, e.g. fillings and extractions, the child is referred to the dentist. Who is doing the behaviour shaping (tell–show–do)? Who is telling the patients and the parents what is going to happen when the child has to experience LA, drilling, filling or an extraction? Who gives sufficient information, based on the individual need for details?

The system includes a risk of lack of communication and the busy schedule makes it tempting for the dentist to just start the treatment and see what happens.

How may the DH and the dentist support each other in helping the child cope with treatment and be willing to come back for regular care in the future? The DH, who meets the inexperienced child for the first time, will have the responsibility of establishing a good relationship and introducing the child to the general procedures in a dental clinic (behaviour shaping). This is the basis for preparing the child for dental procedures that he/she sooner or later will have to confront. When the small child has finished the dental exam and has no treatment needs, any scheduled appointment time available should be used to introduce and train in dental procedures like brushing and polishing teeth with a rubber cup. This gives the opportunity of increasing their feeling of coping and reducing the risk of future DA and BMP (Davey 1989).

Then one day the DH diagnoses a cavity and the child is scheduled for an appointment with the dentist. The dentist should undergo similar procedures to establish a trusting relationship with the child and introduce the invasive procedures by the use of behavioural-shaping techniques. If these procedures are not done or have failed, one may imagine the following dialogue when the child attends his/her next visit to the hygienist: 'You have got a filling. You managed the dental treatment!' P: 'I don't want LA any more'. The LA procedure at the dentist's office has been a negative experience for the child. This is the time for CBT, which may be done by either a dentist or a dental hygienist. DH: 'Tell me about the dental injection. What happened? What did you feel? If you imagine having another injection, what is the worst thing that may happen?' Then the child is given information about how the bodily feelings are protecting him/her when in an unpleasant situation. If the CBT is done by the DH and the child is referred back to the dentist for more treatment, the DH has to inform the dentist about important issues for the child during the next LA injection. Since the DH is the person most often introducing the dental clinic environment they represent a huge untapped resource in behavioural sciences.

Counselling and Health Behaviour Change

A Norwegian study has shown that having one or more missed dental appointments and experiences of child behaviour management problems are indicators of dental caries in five-year-old children, when controlling for parents' education and national origin (Wigen, Skaret and Wang 2009). Clinically this means that the child may have lost the effects of previous positive experiences with no invasive treatment that help to cope with future treatment (Davey 1989).

The responsibility for avoidance of dental care for children first of all belongs to the caretakers. There are many reasons for avoidance behaviour in addition to dental anxiety, factors like attitudes to and motivation for dental care will influence the behaviour. The results may again indicate that in the first visit the dental personnel should also focus on the family situation and the parents' own previous experiences and motivation for dental care, and also include compliance for home care. Health behaviour research focuses on various theoretical models and their effectiveness and applicability to change negative health behaviour in the

population. It is shown that new theoretically based techniques for changing health behaviour are promising and have been useful in helping people make lifestyle changes, such as increasing exercise and modifying diet (Prochaska et al. 1994; Resnicow et al. 2002). Also in dentistry, these motivational interviewing-style interventions have shown promising results for a change in preventive behaviours and reduction of caries incidence in mothers of young children at high risk for caries compared to controls (Harrison et al. 2007). Reduction of the need for restorative dental treatment in small children may represent prevention of DA in the future.

Conclusions

Prevention of DA and DP is primarily important in paediatric dentistry since these conditions usually have their onset among children and adolescents and develop over the years into a vicious circle. Prevention implies that the dental treatment procedures have to be introduced in a way that enables the child to cope with the subjective experiences, because coping generates self-confidence and reduced fear in the situation. If a child gives signals of lack of coping because of fear, then the dental treatment should be stopped and fear treatment should be started. The treatment is aimed at decreasing the fear level and changing the disruptive or counterproductive behaviour into cooperation and coping via a trusting relationship between therapist and patient. This will help children to learn new alternative coping strategies that will help them to deal with future treatment effectively (Freeman 2008; ten Berg 2008). CBT is widespread and commonly used in psychology and psychiatry to treat specific phobias in all age groups (see Chapters 8 and 9). More than 80 randomized clinical trials support the efficacy of CBT of anxiety disorders in children and adolescents and the effects seen in these studies suggest that changes are clinically significant as well as statistically significant (Seligman and Ollendick 2011). Studies showing the effect of a few sessions with CBT for treatment of dental phobia and intra-oral injection phobia indicate that the behavioural management approach for preventing fearful children and adolescents from developing DA and DP should be based on CBT (Do 2004).

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Future Research and Applications

Lars-Göran Öst and Erik Skaret

Symptoms, Clinical Characteristics and Consequences

Patients attending special clinics for dental phobia (DP) have poor oral health (Agdal et al. 2008; Wide Boman et al. 2010) compared to the general population. However, Agdal et al. (2010) found that patients with intra-oral injection phobia (IOIP) had much better oral health than DP patients. They went to the dentist more regularly and were focusing on preventive strategies that would postpone a situation with need for oral injections. Variation in oral health for the DP patients is great and it makes sense that people in this group are also focusing on preventive strategies, at least in the beginning of their avoidance period. We can hypothesize that the differences in oral health between the DP and the IOIP groups are due to the difference in avoidance. However, we do not understand the differences within the groups. What is characterizing the group of DP patients that have good oral health?

Research generally focuses on the negative aspects of having a phobia like DP or IOIP. Do some patients have positive secondary effects of their phobia? Will treatment open up problems that the phobia 'protected' them from, for example negative interpersonal relationships/partnerships and losing sympathy from other people? In such a case this is probably related to motivation for treatment and represents barriers for anxiety treatment.

Epidemiology

Regarding research on the epidemiology of dental anxiety and phobia, the current situation is far from satisfactory. Most studies investigating the prevalence of dental phobia have simply used a self-report scale, most commonly the Dental Anxiety Scale (DAS) and decided on a certain cut-off for diagnosis (e.g. 13 or 15 points). There are no epidemiology studies using state-of-the-art methodology in this area, e.g. as in the National Comorbidity Survey-Replication

(Kessler et al. 2012), in which randomly selected individuals are interviewed with the help of a specific interview schedule in order to ascertain if they fulfil any psychiatric diagnoses. Thus, we recommend that researchers interested in the prevalence of dental phobia and anxiety should collaborate with psychiatric epidemiologists and ensure that the questions necessary to arrive at a diagnosis are included in the interview schedule.

Assessment

The first question when it comes to assessment concerns diagnosis and differential diagnosis. As far as we can see today this has to be done by a psychologist (or psychiatrist) trained in carrying out diagnostic interviews with the help of a structured or semi-structured interview schedule, e.g. the Structured Clinical Interview for DSM-IV (SCID-I) or the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV). One important question for future research is whether it is possible to develop a self-report questionnaire that can give equally reliable information as the diagnostic interviews.

Another important issue is to develop a battery of assessment methods to be used in randomized controlled trials (RCTs) and a smaller version of this battery to be used in clinical work. This battery should cover all important aspects of dental phobia and employ more than self-report scales, e.g. behavioural approach/avoidance tests (BAT) as in the Haukebo et al. (2008) and Vika et al. (2009) studies. During a BAT simple psychophysiological assessment, e.g. of heart rate and blood pressure, could also be made (e.g. Lundgren et al. 2006). Furthermore, an independent dentist could rate the patient's behaviour (e.g. Berggren and Linde 1984) while in the dentist chair undergoing dental treatment after anxiety therapy. Finally, different aspects of the dental phobia should be covered via self-report scales, e.g. beliefs (Milgrom et al. 1995), cognitions (De Jongh et al. 1995), coping strategies (Bernson et al. 2007), dental experiences (Oosterink et al. 2008) and satisfaction with dental visits (Hakeberg et al. 2000).

It goes without saying that all of these measures must go through a psychometric evaluation before being used in research and clinical settings. The final hurdle then is to get researchers and clinicians to use this kind of a battery. Editors of scientific journals can help by only accepting studies for publication if they use a broad battery of assessment instruments. Clinicians need to be informed, e.g. in continuing education courses, that their treatment of DP patients will be made easier and the outcome improved by using the assessment battery. We also recommend that clinicians continuously evaluate their treatment of these patients by at least employing self-report instruments before and after therapy. This enables a comparison with the therapy effects obtained in randomized clinical trials.

Aetiology

In 1920 John Watson published his famous study on little Albert who was taught to be afraid of white animals by being subjected to classical conditioning in the laboratory; pairing the presence of the animal with a loud scary noise (Watson and Rayner 1920). Some American researchers followed in Watson's footsteps up until the 1950s when these kinds of studies were no longer accepted by ethical committees.

One alternative when studying aetiological factors is to carry out longitudinal studies. These need to start with a large group of young children, before the normal age of onset for dental phobia, and assess them with a large battery of parameters. Then the sample has to be followed up frequently enough to be able to catch the various onset circumstances, while it is fresh in their memory, for the 3–5 per cent of the sample that is supposed to develop dental phobia. This kind of research is costly and also suffers from the restriction that only those factors assessed at the start of the study, or at a previous assessment, can be used as a predictor.

As far as we can conclude from research (e.g. Öst 1985) the way a phobia has been acquired does not seem to be of any importance when it comes to treatment. Rachman (1977) described three known pathways to fear or phobia: (i) direct conditioning; (ii) modelling and (iii) instruction or transformation of information. In addition, there might be other ways that have not yet been discovered. Irrespective of which of these pathways patients ascribed the onset of their phobias to, common CBT methods seem to be about equally effective. One should also keep in mind that most patients are in their mid-30s when applying for treatment and have had dental phobia for more than 20 years on average. Since a therapy for any type of psychiatric disorder cannot change the original causes (i.e. the onset circumstances) the focus needs to be on the factors that currently maintain the disorder, e.g. the strong belief or conviction that a catastrophe will happen if one sees a dentist to obtain dental treatment.

Intra-Oral Injection Phobia

Very little research has been undertaken regarding IOIP so far. The field needs experimental laboratory studies to investigate the relationships between this phobia and injection phobia (IP) in general, DP and blood-injury phobia (BIP). What behavioural, cognitive and physiological responses do these phobias have in common and what responses differ significantly between the phobias?

From a diagnostic point of view the degree of overlap between IOIP, IP, DP and BIP is of great interest. This also leads to the question of comorbidity between various combinations of phobias in this area. How common is comorbidity and does it predict outcome negatively? Recent research in specific phobias (Ollendick et al. 2010; Öst et al. 2001) and social phobia (Öst et al. in press) in youth indicates that: (i) comorbidity does not impede the outcome of the primary disorder and (ii) the comorbid disorders improve significantly without being focused on in treatment. However, it remains to be seen if this also holds true for the current group of specific phobias in adults.

As a clinician an important question for future research is whether any of the phobias in this quartet is always the ‘lead singer’, i.e. the motor that drives the other and thus needs to be treated first, or if this varies from patient to patient.

Dental Anxiety in Children and Adolescents

Problems concerning prevalence are the same for the younger age groups as for the adult population; often based on self-reports and certain cut-offs for diagnoses. The instruments used generally lack adequate or sufficiently explained theoretical foundations (Armfield 2010).

Treatment studies in children with behaviour management problems and/or dental anxiety often focus on how to modify the child's behaviour to make it easier to perform the dental treatment. Examples of techniques include relaxation, distraction, hypnosis and a focus on increasing control and predictability. Methodological issues involve differences in age, culture, sampling methods and validity of measures (e.g. dental anxiety (DA) and dental behaviour management problems (DBMP)) and should be more theory driven (Klingberg and Broberg 2007). Many studies include pharmacological methods or combinations of a psychological and a pharmacological approach. Greater focus and effort should be directed towards psychological interventions that will reduce the child's anxiety in the long run without the need for pharmacological support. There are few RCTs comparing different approaches in children (Porritt, Marshman and Rodd 2012). There are, however, studies showing effective treatment of children with other phobic disorders (Öst et al. 2001; Seligman and Ollendick 2011), but as far as we know there are no RCTs testing treatment of children with DP or IOIP. Since the mean age of onset for DP is 11–12 years (Öst 1987) it is important to intervene and reverse the dental anxiety problem at an early age. Future research should test the efficacy of an adjusted version of a CBT approach in one or more sessions among younger age groups with DP.

Multi-Modal Cognitive-Behavioural Treatment

Multi-modal treatment is based on an old behavioural tradition: the psychological part is rooted in systematic desensitization, as developed by Wolpe in the 1950s. Today there are two more modern characteristics: the phobic scenes are presented via 30-second video clips and EMG biofeedback is added to help the patient monitor his/her level of tension while watching the scenes.

An interesting question concerning this treatment is whether it could be rendered even more effective by including exposure *in vivo* in the psychological part? Another important question is if there are any pre-treatment predictors of patients who do well enough after the psychological part not to need two sessions with the dentist. Two other sub-groups may also be of interest: those who never make it to the dentist and those who complete the treatment by attending two sessions with the fear clinic dentist.

One-Session Treatment

Our clinical experience with one-session treatments (OST) for dental phobia indicates that there are some important questions that are in need of empirical research. One concerns the best way for the dentist to build a good therapeutic alliance when the patient is handed over from the psychologist at the beginning of the session. The psychologist needs to adequately prepare the patient for this transfer. Also, the dentist needs to apply various principles in order to build a good therapeutic alliance as soon as the patient enters the treatment room.

Another issue may arise when the dentist presents his/her rationale for the OST: the patient may doubt that just one three-hour session will be enough to treat a dental phobia that he/she might have suffered for 20 years or more, which is the case for most dental phobia patients. It is probably enough to convey the idea that the OST will lead to sufficient change in the patient's phobia to carry on without additional help from the therapist.

The Combined Treatment

Dentists who intend to practice CBT in only a few sessions need a resource-demanding course to obtain sufficient knowledge and training in CBT. Some basic questions are: How can the dentist learn to keep focusing on the anxiety treatment and avoid focusing on the dental treatment requirements too soon? Two important elements of the one-session CBT are time consuming to learn for a non-psychologist: the flexibility that is key for the continuing exposure; and how to explore and recognize the patient's catastrophic beliefs. Both graduate and postgraduate courses for dentists should include more about the basic theories and some training in how to implement the basic principles of CBT in their daily clinical routines. This will make new dentists more capable of preventing fearful children from being anxious and avoidant. To be a therapist treating phobic patients the dentist has to go through supervised training in CBT and the competence has to be evaluated and quality assured.

In Norway, a university model (Haukebø et al. 2008; Vika et al. 2009) has been implemented in the public dental health setting where five teams of dentists and psychologists went through an educational programme and were trained in CBT. It was concluded that the phobia treatment model was also effective when the educated dentists in the public dental health studied CBT for both dental and intra-oral injection phobia (Skaret et al. 2012). Different models with the psychologist and the dentist working together should be tested. For example, a psychologist with sufficient competence in dentistry may easily do most of the exposure steps for different procedures in the dental setting, e.g. for patients avoiding intra-oral injections and drilling and patients with severe gagging problems.

Therapeutic alliance is a key factor for successful CBT of DP. More research aimed at exploring the factors related to the establishment of the mutual trustful relationship between the patient and the therapist would be interesting. When 77 per cent of the DP patients are able to cope with ordinary treatment after CBT (Haukebø et al. 2008) and 89 per cent of the IOIP patients were able to receive oral injections (Vika et al. 2009), what is characterizing the unsuccessful cases? Future research should focus on these patients, thus representing the potential for an even higher percentage of successful cases.

The Meta-analysis

The meta-analysis included only 22 studies that fulfilled the criteria that patients had been randomly allocated to one treatment and one control condition or to two (or more) active treatments. This is a low number considering that they have been published during a 35-year period (1974–2008). One self-evident question is whether there are a number of non-significant CBT studies in the “file drawers” of researchers that were never published. A related question is, of course, if there are any randomized controlled trials of other psychological treatments, e.g. hypnotherapy or psychodynamic therapy. If so, it would be interesting to include them with CBT studies in a broader meta-analysis of psychological treatments in dental phobia.

It would also be interesting to see new treatment methods being used for dental phobia. Regarding specific phobia, new technological developments such as internet-based treatment (Reger and Gahm 2009) and virtual reality (Meyerbröker and Emmelkamp 2010) have been employed successfully and it is possible that they could work for dental phobia as well.

Prevention of Dental Phobia

There are no RCTs testing different universal approaches for prevention of dental anxiety in children. Some RCTs for indicated prevention have been published and most of them have tested the efficacy of different pharmacological approaches. The effect of sedation for treatment of potential painful procedures (e.g. extractions) in children is well established.

Yet more studies with descriptive and retrospective designs looking at the multi-factorial aetiological factors of dental anxiety in children will not give us sufficient knowledge. The self-reports of early experiences are often suffering from lack of validity. Longitudinal studies may over time explore possible predictors and create hypotheses that have to be tested in RCTs. These designs are time and resource consuming but are the only way to gain new evidence for effective preventive interventions.

Children with many carious lesions at the age of five years are at high risk for being dentally anxious at the age of 10 (Raadal et al. 2002). Prevention of need for dental treatment is also a prevention of dental anxiety. Whereas health education alone has not been successful (Benitez, O'Sullivan and Tinanoff 1994; Tinanoff et al. 1999), we have empirical evidence for the effect of motivational interviewing (MI) – a method of counselling clients (Miller and Rollnick 2002). Systematic reviews and meta-analyses of RCTs using MI as the intervention have confirmed the effect of changing negative health behaviour in paediatric health care (Erickson, Gerstle and Feldstein 2005) and MI is now gathering increased interest in different health settings. Also in dentistry these MI-style interventions have shown promising results for changing preventive behaviours in mothers of young children at high risk for caries. Weinstein et al. (2004) have conducted a study in a population with a high risk of early childhood caries (ECC). The results suggest that MI counselling has an effect on children's dental health that is greater than the effect of traditional health education (Weinstein et al. 2004). Such counselling can be integrated into routine health education in both dental and public health.

Children with genetic predisposition of BIIP may experience an injection as very unpleasant because of the characteristic vasovagal response (decrease of blood pressure) (see Chapter 5). Dental anxiety may relatively often be connected with aspects of BIIP, especially among girls (Vika et al. 2008). We do not know to what extent previous experiences of negative bodily sensations in other situations (e.g. vaccinations and situations including needles and blood) also increase the risk of avoidance of dental treatment.

Rapid increase in access to the internet has made this a new area for computer-mediated public health interventions. Computerized, exposure-based therapy programmes have been developed and are shown to be effective in the treatment of dental injection fear (Coldwell et al. 1998). Computer based programmes/Internet homepages can also be constructed around health behaviour theory and thereby act as instruments for the prevention of dental anxiety. A flexible software program with particular focus on a user-friendly interface and the feeling of being involved in the decision making (theories of autonomy and self-determination) has been pilot tested and shown to be promising for adolescents (Sovdsnes et al. 2010).

Using a memory restructuring strategy to enhance dental behaviour is a brief intervention shown to be effective in reducing fear of future treatment (Pickrell et al. 2007). The results showed that, compared to controls, children in the intervention group changed their memory of the fear and the experience of pain from the first treatment session and lowered the fear in the next session. The technique would be indicated particularly in clinical situations where

there is a potential for negative events to occur (e.g. injections, drilling, extractions) and is employed *after* the dental procedure (Pickrell et al. 2007). The strategy is easily adaptable to clinical practice and should be further tested for applicability in daily routines.

Conclusions

The chapters in this book show that the field has advanced quite a lot since the early stumbling steps in the 1970s. However, we still have a long way to go in order to fully understand how dental anxiety and phobia develop, which individuals are vulnerable to these problems, how to best diagnose and assess dental phobia and how to treat the disorders most effectively. Since on average 73 per cent of the patients in RCTs have a clinically good effect there is still a need for further improvement of current treatments as well as developing new ones. The mean age of onset is 11–12 years, which points to the requirement to develop treatments for children and adolescent with dental phobia, something that so far has been almost neglected. Parallel with such research we should develop more effective prevention methods so that, ideally, vulnerable individuals never find themselves in a situation where they have developed dental phobia and require treatment for it.

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Index

- acceptability, 120
- adult dental anxiety scales, 23
- aetiological theories, 51
- afraid of drilling, 145
- afraid of endodontic treatment, 147
- afraid of extractions, 146
- age of onset, 64, 207, 224, 227
- aggressive defences, 50
- anaesthetic cream, 128
- anaesthetic injection, 34, 74, 127, 128, 209
- anaesthetic syringe, 127
- anxiety curve, 122, 123, 126, 140
- Anxiety Disorders Interview Schedule for
DSM-IV, 36, 37, 121, 224
- applied relaxation, 166, 179
- applied tension, 71, 72, 95, 116
- assessment, 33, 35, 48, 69, 81, 113, 148, 150,
157, 167, 172, 224
- avoidance of dental care, 6, 22, 58, 139, 148, 216

- basic assumptions, 98
- behaviour therapy, 91, 94, 119, 165, 179
- behavioural approach test, 35, 169, 171, 172,
178
- behavioural elements, 49
- behavioural experiments, 99, 100, 116, 129,
132, 165

- behavioural rating, 23, 24, 81
- benzodiazepines, 157, 158, 159, 160,
194, 214
- biofeedback, 94, 110, 116, 165, 224
- blood-injury-injection (BII) phobia, 63, 69,
116, 144, 213

- catastrophic beliefs, 64, 70, 97, 100, 132, 138,
140, 142, 146, 149, 165, 208, 225
- CBT, 93, 95, 96, 97, 98, 99, 100, 101, 112,
113, 114, 130, 139, 156, 161
- CBT in different health care systems, 177, 178,
188
- CBT in non-western cultures, 187
- challenging beliefs, 99
- children and adolescents, 25, 26, 27, 53, 79, 159,
205, 207, 223
- Children's Fear Survey Schedule – Dental
Subscale, 24, 69, 81
- child-specific dental anxiety scales, 23, 24
- claustrophobia, 35
- clinically significant improvement, 95, 120, 178
- cognitive behaviour therapy *see* CBT
- cognitive behavioural analysis, 121
- cognitive-behavioural model, 95, 98
- cognitive element, 48
- cognitive restructuring, 113, 116, 124, 166

- cognitive therapy, 93, 97, 103, 164, 165, 188
 combined dental and anxiety treatment, 135, 136
 conditioning framework, 52
 conscious sedation, 153, 154, 155, 159, 160, 161, 194, 214
 control, 135, 136, 137, 140, 141, 142, 143, 144, 145, 146, 147, 153, 155, 156
 controlled effect size (ES), 177, 180
 coping, 39, 45, 74, 136, 138, 176, 177, 179, 202, 206, 211, 214, 216, 219
 criteria for empirically supported treatments (EST), 101
- D-Cycloserine, 190, 195
 deep sedation, 153, 155
 deflection of attacks, 50
 demonstration of utensils, 128
 dental anxiety, 3, 4, 5, 6, 7, 8, 9, 14, 15, 21, 22, 23, 24, 27, 136, 139, 149, 153, 170, 203, 213, 226
 Dental Anxiety Inventory, 5, 24, 38, 185
 Dental Anxiety Scale, 5, 10, 23, 37, 38, 69, 84, 112, 169, 171, 176, 178, 221
 Dental Anxiety Scale – Revised, 38
 dental behavior management problems, 179
 Dental Belief Survey, 24
 Dental Belief Survey – Revised, 24
 Dental Cognitions Questionnaire, 39, 165
 Dental Coping Strategy Questionnaire, 39
 dental factors, 52, 53, 54, 58, 201, 202, 203
 dental fear, 7, 21, 23, 35, 37, 38, 45, 47, 49, 51, 53, 55, 79, 80, 111, 112, 185
 Dental Fear Interview, 37
 Dental Fear Survey, 5, 23, 38, 112
 dental health, 68, 214
 dental health service, 214
 dental hygienist, 112, 217
 dental phobia, 3, 6, 21, 28, 33, 34, 45, 52, 55, 79, 119, 126, 146, 192, 203
 dental status, 9
 Dental Visit Satisfaction Scale, 40
 dental vulnerability, 204
 dentist as therapist, 137, 155
 dentist behaviour, 203
 depression, 210
 diagnostic interview, 36, 69, 121, 222
 differential diagnoses, 34
 disgust, 66, 67
 drilling, 128, 145, 146, 210
 DSM, 33
 DSM-II, 33
 DSM-III, 33, 171
 DSM-IV, 3, 22, 33, 34, 36, 37, 63, 121, 136, 222
- eating disorders, 93, 102
 emotional elements, 49
 empirically supported treatments, 100, 120
 epidemiology, 3, 21, 221
 evaluation of dentists, 130
 evidence base, 91, 100, 101
 experimental treatments, 101
 exposure *in vivo*, 95, 100, 102, 110, 124, 138, 163, 164, 167, 176
 exposure and response prevention, 92
 external/social factors, 52, 53, 54, 58, 201, 202
 extra-oral injection phobia, 34
- fainting response, 66, 67
 fearful children, 207
 filling, 74, 115, 128, 145, 146
 focus of the treatment, 138, 148
 functional fear response, 137, 140
- gagging, 147, 148
 gender ratio in BII phobia, 64
 general anaesthesia, 7, 12, 109, 111, 113, 153, 154, 155, 156, 193, 214
 general beliefs, 98
 general vicious circle of dental phobia, 57, 58
 genetic, 51, 52, 86, 213
 geriatric patients, 102
 graded exposure, 113, 190
- hierarchy, 109, 110, 124, 131, 133, 141, 142, 145, 163, 164, 190
- ICD-10, 22, 34
 immobility, 50
 Index of Dental Anxiety and Fear, 5, 23, 39
 information, 122, 123, 125, 127, 131, 147, 161, 192, 204, 205, 207
 Injection Phobia Scale, 69
 internal vicious circle, 55, 56

- interpersonal aspects, 45
- intra-oral injection phobia, 34, 63, 64, 69, 141, 142, 143, 225
- intravenous sedation, 159, 194
- Level of Exposure-Dental Experience Questionnaire, 40
- local anaesthesia, 46, 137, 146, 147, 193, 213, 215
- long-term effects of CBT, 178
- maintenance programme, 126
- Medical Fear Survey, 40
- medications, 97, 155, 157, 197
- memory-revising, 193
- meta-analysis, 120, 163, 172, 177, 225
- mirror, 72, 127, 141, 143, 144, 146, 207
- modelling, 51, 65, 91, 124, 132, 164, 166, 192
- Modified Dental Anxiety Scale, 5, 23, 69, 185
- motivation, 113, 123, 156, 186, 207, 208, 211
- multidimensional responses, 23
- multifactorial aetiology, 147
- multimodal psychological treatment, 109
- mutual trust, 96, 139, 225
- Mutilation Questionnaire, 69
- myths, 96, 97
- negative automatic thoughts, 98, 138, 147, 149
- nitrous oxide, 157, 159, 160, 195, 196, 214
- obsessive-compulsive disorder, 34, 35, 36, 92
- odds ratio, 10, 11, 177
- one-session treatment, 119, 121, 126, 129, 144, 151, 164, 165, 209, 224, 228
- oral health, 4, 7, 8, 9, 11, 12, 13, 21, 22, 28, 38, 68, 82, 111, 139, 153, 185, 186, 189, 201, 221
- oral premedication, 194
- pain, 46, 51, 52, 54, 55, 65, 68, 70, 71, 72, 74, 86, 126, 127, 128, 137, 141, 143, 145, 146, 147, 153, 154, 156, 157, 188, 203, 203, 211, 212, 213, 214
- pain cells, 143
- pain control, 55, 153, 195, 211
- panic disorder, 34, 35, 55, 64, 98, 100
- participant modelling, 124
- patient control, 142, 213
- personal factors, 52, 53, 58, 201
- personality, 48
- pharmacological methods, 214, 224
- physiological elements, 49
- physiological techniques, 24
- possibly efficacious, 101
- post-traumatic stress disorder, 34, 35, 93, 191
- post-treatment interview, 126
- preoperative assessment, 157, 161
- preparedness, 51, 65
- pre-treatment clinical interview, 121
- pre-treatment instructions, 123
- prevalence, 3, 24, 25, 26, 27, 28, 36, 63, 64, 81, 82, 83
- prevention, 135, 154, 193, 201, 202, 203, 215, 217, 226
- probably efficacious, 101, 102, 106
- progressive relaxation, 109, 110, 114, 165, 176
- projective scales, 24
- proportion managing dental treatment, 176
- psycho-education, 116
- psychological factors, 85, 86
- psychologist, 33, 72, 111, 112, 113, 114, 116, 117, 129, 137, 138, 140, 149, 150, 165, 170, 179, 189, 222, 224, 225
- psycho-physiological, 110
- psycho-physiological treatment, 111
- psychosocial effects, 5, 7, 11, 13, 15
- publication bias, 178
- quality of life, 12, 13, 22, 68
- rapport, 139, 203, 204
- regression, 47
- relationship-creating procedures, 125
- relaxation, 49, 91, 93, 109, 110, 111, 114, 116, 163, 164, 165
- results of one-session treatments, 120
- safety behaviors, 35, 64, 99, 100, 136, 138, 144, 211
- sedation, 113, 114, 153, 154, 155, 156, 157, 158, 159, 160, 161, 189, 190, 193, 195
- self-assertiveness, 114, 116
- Short Dental Anxiety Inventory, 38

- social phobia, 34, 35, 36, 37, 166
- specific phobia, 5, 28, 33, 34, 37, 41, 51, 63, 64, 66, 68, 119, 120, 121, 129, 136, 163, 167, 223
- stress inoculation training, 165, 166
- strong emotions, 97
- Structured Clinical Interview for DSM-IV, 28, 36, 121, 222
- structured clinical interviews, 36
- structured rating, 36, 172
- symptom substitution, 96
- symptoms, 3, 4, 6, 13, 15, 23, 33, 34, 40, 65, 96, 100, 144, 221
- systematic desensitization, 14, 91, 109, 110, 116, 163, 165, 176, 179, 224
- systematic review, 163, 167, 226
- team-work, 96
- tell-show-do, 157, 161, 192, 206, 212
- the combined treatment, 135, 225
- therapeutic relationship, 96, 129, 130
- thoughts and feelings, 97, 136
- topical anaesthetic, 142
- training dentists, 129
- training programme, 129
- treatment principles, 99, 140
- two-factor theory, 65
- uncontrolled ES, 176
- vicarious conditioning, 51, 65
- vicious circle, 4, 6, 12, 15, 25, 55, 56, 57, 58, 201, 210, 214, 217
- video, 14, 81, 110, 130, 164, 165, 166
- withdrawal, 11, 49
- working alliance, 125